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Dimensions of Consumer Expertise

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The purpose of this article is to review basic empirical results from the psychological literature in a way that provides a useful foundation for research on consumer knowledge. A conceptual organization for this diverse literature is provided by two fundamental distinctions. First, consumer expertise is distinguished from product-related experience. Second, five distinct aspects, or dimensions, of expertise are identified: cognitive effort, cognitive structure, analysis, elaboration, and memory. Improvements in the first two dimensions are shown to have general beneficial effects on the latter three. Analysis, elaboration, and memory are shown to have more specific interrelationships. The empirical findings related to each dimension are reviewed and, on the basis of those findings, specific research hypotheses about the effects of expertise on consumer behavior are suggested.

Despite the recognized importance of knowledge-related variables, consumer knowledge has only recently become an independent area of research and theorizing. Traditionally, knowledge has been treated as a *unidimensional* construct, most often referred to as product familiarity or prior knowledge. That is, consumers are assumed to have some amount of experience with or information about particular products. This construct has been operationalized by various measures that have typically been used as one of several independent variables. These measures include frequency of purchase (Anderson, Engledow, and Becker 1979; Bettman and Park 1980; Kiel and Layton 1981; Newman and Staelin 1973; Park and Lessig 1981), objective tests (Brucks 1985; Jacoby, Chestnut, and Silberman 1977; Staelin 1978; Sujan 1985), formal training (Hutchinson 1983; Sujan 1985) and self-report measures (Alba 1983; Hutchinson and Farrand 1982; Johnson and Russo 1984; Moore and Hutchinson 1985; Srull 1983). Although a single factor may be present to some degree in each of these measures, the apparent diversity in the measures suggests that there are also significant differences among them and that a more explicitly multidimensional account of the knowledge variable is needed (see Bettman 1986; Brucks 1986; Brucks, Mitchell, and Staelin 1984; Cole, Gaeth, and Singh 1986; Kanwar, Olson, and Sims 1981; Mitchell 1982; Selnes and Grønhaug 1986; Sirgy 1981).

OVERVIEW

We propose that consumer knowledge has two major components: *familiarity* and *expertise* (cf. Jacoby et al. 1986). Familiarity is defined as *the number of product-related experiences that have been accumulated by the consumer.* Expertise is defined as *the ability to perform product-related tasks successfully.*

Product-related experiences are defined at the most inclusive level. They include advertising exposures, information search, interactions with salespersons, choice and decision making, purchasing, and product usage in various situations. Similarly, we use the term consumer expertise in a very broad sense that includes both the cognitive structures (e.g., beliefs about product attributes) and cognitive processes (e.g., decision rules for acting on those beliefs) required to perform product-related tasks successfully.[1]

In general, increased product familiarity results in increased consumer expertise. However, different tasks require different types of expertise and, therefore, task performance is improved by different types of experiences. Moreover, the successful performance of any particular task generally requires more than one type of knowledge. The central thesis of this paper is that there are at least five qualitatively distinct aspects of expertise that can be improved as product familiarity increases. These "dimensions" of consumer expertise are identified in the following basic propositions:

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[1]There is a long-standing debate in the cognitive literature on the extent to which hypotheses about structure and process can be tested independently (e.g., Anderson 1978; Pylyshyn 1979). We interpret the majority opinion to be that all measures of cognitive performance are affected to some degree by both the structures used to represent information internally and the processes that operate on those structures during the performance of any given task. Nevertheless, some tasks may safely be assumed to depend mainly on one or the other.

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P1: Simple repetition improves task performance by reducing the cognitive effort required to perform the task and, in some cases, repetition leads to performance that is automatic.

P2: The cognitive structures used to differentiate products become more refined, more complete, and more veridical as familiarity increases.

P3: The ability to analyze information, isolating that which is most important and task-relevant, improves as familiarity increases.

P4: The ability to elaborate on given information, generating accurate knowledge that goes beyond what is given, improves as familiarity increases.

P5: The ability to remember product information improves as familiarity increases.

OBJECTIVES AND ORGANIZATION

The next five sections in this paper consecutively discuss each of these propositions. Special attention is paid to how the reduction of cognitive effort and the development of cognitive structure improve a consumer's ability to analyze, elaborate on, and remember product information. In determining the contents of each section we were guided by four general objectives.

First, we wanted to provide a comprehensive review of pertinent empirical results from the psychological literature.

Second, we wanted to provide a clear organization of this diverse literature. The five basic propositions are used to identify conceptually related results. However, each proposition does not correspond to a single area of psychological investigation. Frequently, the relevant results span several areas. Moreover, we only discuss results that are directly related to the basic proposition. Therefore, this review is at once broader and more focused than the reviews that currently exist in the psychological literature. Also, each section stands alone insofar as it identifies a separate dimension of consumer expertise; however, each dimension also interacts causally with the other dimensions. Thus, the effects of product familiarity are synergistic. We discuss these interactions as they occur throughout the paper.

Third, we wanted to identify the ways in which the psychological results are most likely to be relevant in consumer situations. In some cases, specific consumer research exists that demonstrates such implications. More frequently, the implications are necessarily speculative and should be viewed as hypotheses. All of the specific research hypotheses discussed are summarized briefly at the end of each section and stated explicitly in an Exhibit.

Finally, we wanted to discuss theoretical explanations of the described empirical results at a level of analysis that is most appropriate for consumer research. In our opinion, consumer expertise is best described at a level that is more specific than the level normally adopted in consumer research (where it is a subcomponent of broader theories) and more general than the level normally adopted in psychology (where there is as yet no single, widely accepted theory of expertise or learning). The psychological literature is replete with theoretical controversies. Most of the competing theories, however, account for the major findings equally well, and argumentation generally focuses on the existence of critical experiments or the value of parsimony. Therefore, we have attempted to provide explanations in general terms that are as consensual as possible. We reference competing viewpoints but describe them in detail only when they have some direct relevance for consumer behavior. Essentially, the intended contribution of this paper is "pretheoretical" insofar as it identifies basic empirical phenomena that must be explained by *any* theory of consumer expertise.

COGNITIVE EFFORT AND AUTOMATICITY

There are simple but powerful effects of repetition on virtually every type of cognitive task: tasks are performed more rapidly and make smaller demands on cognitive resources. Assuming that consumers generally have a disutility for cognitive effort, one major benefit of product familiarity should be a reduction in effort expended during consumer decision making and product usage (cf. Einhorn and Hogarth 1981; Hoyer 1984; Payne 1976; Russo and Dosher 1983; Thomas 1983; Wright 1975a). Also, most consumer behaviors may be viewed as a complex series of mental and physical tasks. As cognitive demands are reduced for any particular task, resources should become available for other tasks, and overall performance should improve. The cognitive effort required for some types of tasks eventually may be reduced so far that the task is performed automatically. That is, the task is performed whenever appropriate stimuli are present, without conscious control, and with little or no effect on other concurrent tasks.

Reduced Cognitive Effort

The main result of research on the effects of repetition, or practice, on cognitive effort is that performance time decreases as a power function of amount of practice—without any loss in the quality of performance. Although it is not particularly surprising that performance "speeds up" with practice, the fact that a single functional relationship characterizes virtually all investigated examples of speed-up suggests that it is a rather fundamental property of the learning process (see Newell and Rosenbloom 1981 for an excellent review of this phenomenon). The tasks that have been studied span a broad range of perceptual, cognitive, and sensory/motor tasks, including scanning for visual targets (LaBerge 1974; Posner and Snyder 1975; Schneider and

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Shiffrin 1977), retrieving facts from memory (Pirolli and Anderson 1985), computer-based text editing (Moran 1980), and making social judgments (Smith and Lerner 1986). Therefore, it is reasonable to expect these effects across an equally broad range of consumer behaviors such as package identification, information search, decision making, and product usage.

In addition to documenting the extraordinary regularity of speed-up, the power law relationship has been interpreted as evidence that improvement becomes increasingly difficult, or that the most effective improvements are made first. The implication of this result is that gains in effort reduction can be expected after fairly few experiences with the same product-related task. Thus, the effects of effort on a given task should be most evident in first-time shoppers and during trial usage or, on a broader scale, during the introductory phase of an innovative type of product (e.g., bank teller machines).

Automaticity

Although the term has been defined somewhat differently by different authors, at a general level automaticity has been used to refer to processes that *can be performed with minimal effort* and *without conscious control* (e.g., Bargh 1984; Fisk 1986; Hasher and Zacks 1979, 1984; Hirst et al. 1980; LeBerge and Samuels 1974; Schneider and Shiffrin 1977; Shiffrin and Dumais 1981; Shiffrin and Schneider 1977; Welford 1976; Zacks, Hasher, and Hock 1986). Thus, speed-up is a necessary but not sufficient condition for automaticity. Typically, it has been assumed that conscious control requires the use of general cognitive resources that can be allocated to any type of task (see Hirst et al. 1980, Navon 1984, and Shiffrin and Dumais 1981 for detailed discussions and critiques of the cognitive resource construct). Thus, automaticity "frees up" these resources for use in other (nonautomatic) processes, thereby improving overall performance.

Although there is some debate regarding the status of automaticity (i.e., as a qualitatively distinct type of processing versus an extreme point on a continuum of speed and conscious control), there is good agreement that automaticity develops rather slowly, requiring high levels of practice on tasks that do not vary much in terms of the mappings between stimulus and response that they entail. Thus, automaticity results from the overlearning of very specific skills.

The consumer implications of automatic processing are fairly straightforward. Automatically processed tasks can be performed simultaneously with other tasks without significant reduction in efficiency. Consider, for example, the case of homemakers who have been brand loyal to Tide laundry detergent for many years. They have had extensive experience with a particular visual detection task—finding the Tide package. Most of their experience with this task has been finding the product in their own homes. Given years of experience, it is likely that this task has become automatic. It is also likely that the automaticity will transfer to other situations. For example, during grocery shopping Tide will be detected automatically, and thought may be devoted to other shopping-related tasks.

The implications of automaticity are not limited to reductions in cognitive effort, however. There are two other properties that are significant. First, once a stimulus–response relation has been automatized, it is difficult to change (Neves and Anderson 1981; Shiffrin and Dumais 1981). Therefore, changes in package design or logotype may significantly reduce a brand loyal customer's package-finding ability. The likelihood of re-evaluating the choice and possibly trying other brands will certainly increase once the identification ceases to be automatic. The second significant property of automaticity is that the detection process does not require conscious control and occurs whenever the stimulus is present, unless it is specifically inhibited by conscious processes (see Bargh 1984 for a discussion that emphasizes this property). Therefore, the package will be noticed wherever it appears—in the homes of others, in advertising, in motion pictures, etc. This clearly enhances the effectiveness of all marketing communications that include the logotype or realistic depictions of the package.

Although much research has been devoted to decision making, the simple process of finding the choice alternatives or finding previously chosen alternatives has not been studied extensively (Hoyer 1984). Introspection suggests that such processes are rather common and highly influenced by the sort of familiarity effects discussed here. These effects will have an especially strong impact when the consumer is under time pressure or when the stimulus environment is complex (e.g., supermarket displays of nonprescription drugs).

Another important aspect of automaticity is the extent to which abstract properties of stimuli can be detected. Recently, Schneider and Fisk (1984) demonstrated that the automatic detection of words belonging to a particular category (e.g., animals) generalizes to words that were never seen during the training period (also see Alba et al. 1980; Barsalou and Ross 1986). They suggest such automatic process could "semantically filter" incoming information. For instance, over many years a photography hobbyist is likely to spend much time searching for camera information. At some point the detection of camera-related words might become automatic, and the hobbyist will likely notice camera information even when s/he is not deliberately searching for it.

In addition to semantic filtering at the product class level and the brand-specific automaticity discussed earlier, there is reason to expect automatic semantic filtering of a different sort to occur without a large number of prior brand-related experiences. Bargh (1984) has argued that people automatically process *self-relevant* in-

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formation. He notes that people are constantly experiencing events with themselves as the central focus, and therefore the category of self-relevant information is likely to be detected automatically as a form of semantic filtering. One consequence of purchasing a product is that information about that product becomes self-relevant; thus, purchase might lead to automatic detection without extensive experience with the product. For instance, many people report that soon after purchasing a new car they suddenly notice that their model car is everywhere, and that identically colored models are especially prevalent. One explanation of this phenomenon is that their car (but not all cars) has become self-relevant. Thus, although automatic detection usually requires an extensive history of product-related experiences, automatic detection at the brand level may follow almost immediately after purchase if there is high personal involvement with the brand or the purchase decision.

Finally, the benefits of reduced cognitive effort and increased automaticity should contribute to the maintenance of consumer loyalty in many situations. This is because the acquisition of even simple product-related skills may be viewed as a significant "start-up cost" for switching from a familiar product to an unfamiliar one (e.g., many personal computers have different keyboard designs).

Specific Research Hypotheses

The various research hypotheses that were discussed in this section are summarized in the order they occurred in Exhibit 1. One strong trend emerges: effort reduction and speeded performance occur rather quickly, whereas the development of automaticity generally requires extensive experience with the same task. This trend identifies the need, when measuring product familiarity, to ensure that an appropriate range of experience levels is covered. Experiments designed to test hypotheses about the effects of product familiarity on cognitive effort and automaticity may produce null results if the critical part of this range is not represented.

Another basic conclusion is also suggested. Reductions in cognitive effort can affect consumer behavior in at least two ways. First, the speed (and possibly the accuracy) with which product-related tasks are performed increases with repetition. Second, when several tasks are performed concurrently or in a series, overall performance is improved by previous experience with any of the component tasks. Thus, reductions in cognitive effort for very specific tasks may have general effects because available cognitive resources are increased. This phenomenon could underlie various main effects of product familiarity. Moreover, such main effects will be better understood when consumer tasks can be analyzed into components and consumer experience with each component can be tracked separately.

EXHIBIT 1

COGNITIVE EFFORT AND AUTOMATICITY: SPECIFIC RESEARCH HYPOTHESES

Summary of hypotheses
Reduced cognitive effort
1.1 Repetition of any product-related task results in more rapid task performance and increases the cognitive resources available for concurrent tasks.
1.2 Gains in effort reduction can be expected after fairly few experiences with the same product-related task.
Automaticity
1.3 Long-time, brand loyal consumers of products that are frequently used and/or purchased develop automatic visual detection processes for their brand.
1.4 Once automatized, visual detection of the brand occurs regardless of the information environment, level of involvement, or difficulty of concurrent information processing, thereby enhancing the effectiveness of all marketing communications that include realistic depictions of the brand.
1.5 Automatic brand detection processes affect the consideration set most strongly when other factors, such as involvement or information load, inhibit the detection of other (nonautomatized) brands.
1.6 Semantic filtering allows expert consumers to automatically detect product-related information in the domains of their expertise.
1.7 When personal involvement with the brand or the purchase decision is high, automatic detection of brand-related information develops shortly after purchase.
1.8 When product usage requires brand-specific skills, the costs of developing such skills inhibit switching between otherwise equivalent brands.

COGNITIVE STRUCTURE

In consumer research, cognitive structure has generally referred to the factual knowledge (i.e., beliefs) that consumers have about products and the ways in which that knowledge is organized (e.g., Brucks 1986; Kanwar et al. 1981; Lutz 1975; Marks and Olson 1981; Mitchell 1982). The principal function of cognitive structure is to differentiate various products and services in ways that are useful for decision making. Obviously, factual knowledge increases with experience. Less obvious is the way in which cognitive structures guide the accumulation of facts.

Although many types of cognitive structure have been discussed in the psychological literature, we will review only one area—category structures. This is mainly because category structures have been one of the most intensively researched types of cognitive structure, especially in regard to how structures guide the accumulation of knowledge. Also, well-established results about natural categories frequently serve as the starting point for research on other cognitive structures. (For a

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discussion of other types of knowledge structures, see Hutchinson and Alba 1985.)

In this section, we discuss the effects of category structure on the order in which facts are accumulated. Thus, category structure can be used to predict which facts are likely to be known by both novices and experts and which facts are likely to be known only by experts. These differences will be described without discussing memory per se. The effects of category structure on memory are discussed in a subsequent section along with other factors that affect memory.

Category Structures

The use of category structures to differentiate objects is well documented in both psychology (e.g., Medin and Smith 1984; Mervis and Rosch 1981; Murphy and Medin 1985; Rosch 1978; Smith and Medin 1981) and consumer research (e.g., Brucks 1986; Cohen 1982; Nedungadi and Hutchinson 1985; Rao and Sabavala 1981; Srivastava, Alpert, and Shocker 1984; Sujan 1985). The marketing constructs of product class, benefit segment, usage situation, and evoked set all entail some type of category structure for competing brands. Thus, the changes in category-based differentiation that occur with increased product familiarity have direct implications for consumer choice.

The development of categorical structure has been investigated in terms of (1) the level of generality of the category, (2) the graded structure that exists within the category, and (3) the extent to which the category is related to specific, nontaxonomic goals. Each of these areas will be discussed in turn.

Basic Level Categories. Some levels of categorization emerge as the predominant way of structuring concepts for a particular culture (or subculture). Objects tend to be spontaneously named at this level, and discrimination at this level tends to be easier than at other levels. This level of generality is frequently called the *basic* level (Rosch et al. 1976; Tversky and Hemenway 1984). Descriptively, the basic level is the level at which within-category similarity is maximized relative to between-category similarity (Mervis and Rosch 1981; also see Jones 1983; Medin 1983; Murphy 1982; Murphy and Medin 1985). For instance, car, rather than vehicle, sedan, or Chevette, has been identified as a basic level category (Rosch et al. 1976). Cars are rather similar to each other and quite different from other vehicles (e.g., boats, airplanes, etc.). Sedans, of course, are highly similar to each other, but they are also quite similar to station wagons and fastbacks. Also, experience in buying, driving, and maintaining a sedan will transfer readily to station wagons, but not to boats or airplanes.

The ease with which basic level discriminations are made suggests that they will be the first categorical structures that are learned in a given domain. This speculation receives substantial support from developmental studies of natural categories (Anglin 1977; Nelson 1977; Rosch et al. 1976) and from laboratory studies using artificial stimuli (Mervis and Crisafi 1982; Murphy and Smith 1982). The implication of these findings is that increased product familiarity results mainly in an increased ability to categorize products at levels above and below the basic level.

An increased ability to categorize *below* the basic level simply means that finer discriminations can be made with greater reliability. Thus, consumers who are familiar with automobiles can distinguish between cars that differ in manufacturer, model, and year. Informal experience suggests that this type of differentiation is much better for one's own type of car than for cars in general. There is also evidence that the basic level itself becomes more specific as expertise increases (Dougherty 1978; Rosch et al. 1976). Thus, an expert may spontaneously label a car as a BMW, whereas a novice may simply describe it as a car.

This trend toward increased specificity is significant because the tendency to identify objects at the basic level undermines the consumer's need to make brand-level evaluations and the advertiser's need to communicate brand-specific information. Thus, experts should be more able to avoid confusions between brands and to remember brand-specific information.

Changes in category structure *above* the basic level are likely to be more qualitative than quantitative. Several researchers have observed that a shift from "surface structure" to "deep structure" categories occurs as expertise increases (Adelson 1984; Chase and Simon 1973; Nelson 1977; Schoenfeld and Herrmann 1982). Deep structure categories tend to be more abstract and more related to important causal mechanisms (cf. Murphy and Medin 1985). Moreover, there is evidence to suggest that the basic level is determined mainly by concrete, perceptual attributes (Murphy and Smith 1982; also see Rosch et al. 1976; Tversky and Hemenway 1984). Therefore, categories that are more abstract are likely to be learned later.

A good example of categories above the basic level is the so-called Basic Four Food Groups (Brody 1981). The original studies of Rosch et al. (1976) found that fruit and vegetables are basic level categories. Therefore, it is reasonable to assume that meat, poultry, fish, eggs, milk, bread, cereals, etc. are also basic level (or higher). It is only through public education that we learn about the broader Food Groups. People who are very familiar with dietary issues may form even broader categories such as high-fiber foods or high-cholesterol foods. (Only plant-derived foods have fiber and only animal-derived foods have cholesterol.) Women who are concerned about osteoporosis may learn to identify high-calcium foods (which include leafy vegetables and sardines as well as dairy products). These categories represent deep structure differences that are directly related to nutritional mechanisms.

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The failure of consumers to appreciate the more abstract levels of categorization is likely to limit the number of products that are considered to be substitutive, potentially resulting in suboptimal choices. Recent research has shown that lower levels of product categorization are more comparable than higher levels, and noncomparability makes choice more difficult (Johnson 1984). Thus, product familiarity should increase the comparability of previously noncomparable products.

Overall, the development of categories above the basic level should permit experts to consider a more heterogeneous set of alternatives than do novices when their need is general. When their need is relatively specific, the development of categories below the basic level should permit experts to consider a more homogeneous set of alternatives than do novices.

Moreover, the development of a deeper category structure should enable consumers to generalize specific product information appropriately (i.e., by neither overgeneralizing nor undergeneralizing). For example, people wishing to eliminate cholesterol from their diet may avoid margarine as well as butter, even though vegetable oils contain no cholesterol. Presumably, this is one reason why many margarine manufacturers stress the point that their product lacks cholesterol.

Finally, Murphy and Wright (1984) have reported evidence that as new levels of categorization and new criteria for categorization are learned, the simplicity of the basic level partitioning gives way to the complexities that are generally found in the world. That is, the differences between members of the same category and the similarities between members of different categories become well known to the expert. This is consistent with the general hypothesis that people process information at the basic level in order to minimize cognitive effort (Rosch et al. 1976; also see Fiske, Kinder, and Larter 1983). Increased expertise results in a more complicated, but more accurate, category structure that represents the exceptions as well as the rule (cf. Weber and Crocker 1983). The cognitive effort required to make use of these distinctions is presumably reduced for experts because of high levels of repetition and because a well-developed category structure permits more extensive chunking of information (Anderson 1983a; Chase and Simon 1973; Fiske et al. 1983; Hayes-Roth 1977; Thorndyke and Hayes-Roth 1979).

Graded Structure. Categorization research over the past decade has established the fact that membership in most, if not all, naturally occurring categories is a matter of degree (Barsalou 1985a, b; Medin and Smith 1984; Mervis and Rosch 1981; Rosch and Mervis 1975; Smith and Medin 1981; Smith, Shoben, and Rips 1974). Some members are better examples of the category than others. For example, Budweiser is a good example of a beer, Lite is not quite so representative, and LA is quite unusual. Moreover, some objects are difficult to categorize at all because they fall on a "borderline" between two or more categories (Labov 1973; McCloskey and Glucksberg 1978). Nonalcoholic or "near" beer provides an example.

This graded structure is often referred to as *prototypicality* (Barsalou 1985b; Cantor and Mischel 1979; Mervis and Rosch 1981; Rosch 1978; Rosch and Mervis 1975; Smith and Medin 1981). Prototypicality is an important factor in the development of cognitive structure because there is considerable evidence that the most prototypical members of a category are learned first. This is true for natural (Mervis and Rosch 1981; Nelson and Nelson 1978) and artificial (Mervis and Pani 1980; also see Homa 1984; Posner and Keele 1968) stimuli. Thus, it is likely that novice consumers will know about prototypical brands, but not atypical ones. Expert consumers will be familiar with both types.

Prototypicality may affect choice in several ways. For instance, in some cases evaluative processes determine the category but not the specific brand. In such situations, brand selection is a simple matter of finding a category member. For example, a host may decide to serve cheese and crackers at a party. At the supermarket, cheddar may be selected because it is prototypical and because no further explicit comparisons were made between cheddar and more unusual types. Again, this would be less likely for a host who is very knowledgeable about cheese.

If novelty is a valuable attribute for its own sake, prototypicality may reduce preference for some items. Thus, an opinion leader for fashion may disdain last year's styles because they are already perceived as ordinary. However, people who have not kept up with current trends may perceive the clothes to be new. On the other hand, if conformity exerts a strong influence on preference, prototypicality may have a positive valence. Examples might include business attire and occupational uniforms. Product familiarity should be less of a factor in this case because prototypical styles are learned easily and will be known to most consumers.[2]

In addition to its likely effects on choice and the accumulation of knowledge, prototypicality also affects analysis, elaboration, and memory. Therefore, the determinants of graded structure are of considerable interest. Most authors have discussed the graded structure of categories in terms of *family resemblance* (Rosch and Mervis 1975; Tversky 1977). That is, good category examples are highly similar to other category members and highly dissimilar to members of other categories.

[2]Interestingly, there is evidence suggesting that the basic level for atypical objects is more specific than the basic level for prototypical objects. In particular, Murphy and Brownell (1985) found that line drawings of prototypical objects (e.g., jeans, butcher knife, and sedan) were most easily identified at the basic level (e.g., pants, knife, and car), but drawings of atypical objects (e.g., gym shorts, electric knives, and racing cars) were most easily identified at the subordinate level. Thus, many of the basic level effects discussed earlier may interact with graded structure.

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Recently, Barsalou (1985a, 1985b; also see Schwanenflugel and Rey 1986) has provided evidence that family resemblance is not the sole determinant of graded structure. *Frequency of instantiation* (i.e., the frequency with which an item is encountered as a category member) and *similarity to an ideal* (i.e., preference) also are strongly related to graded structure. Similar results have been obtained for consumer product categories (Nedungadi and Hutchinson 1985; Ward and Loken 1986).[3]

A fuller understanding of these determinants is important because they are differentially affected by different aspects of marketing communications and product usage. Family resemblance should be affected mainly by the communication of product attributes, regardless of their perceived value to the consumer. Frequency of instantiation should be affected primarily by corresponding frequencies of advertising exposure and product usage. Similarity to an ideal should be most affected by product satisfaction and the persuasiveness of marketing communications. Also, it is possible that when the category as a whole has a negative valence (e.g., used car salesmen), the "ideal" is the least preferred member. This last determinant provides a potentially adaptive mechanism for guiding consumers to the things they value most or away from things they wish to avoid (cf. Cohen 1982; Sujan 1985).

Ad Hoc and Goal-Derived Categories. Most of the structural aspects of categories that have been discussed thus far have been founded on empirical investigations of common *taxonomic* categories such as furniture, vehicles, fruits, and vegetables. Many important categories that are used by consumers, however, are clearly not taxonomic. In particular, categories that are defined in terms of specific shopping or usage situations seem to be of a somewhat different sort (cf. Belk 1975; Dickson 1982; Srivastava et al. 1984). Examples of such categories include "food not to eat on a diet," "things to buy at the drug store," and "modes of transportation from San Francisco to New York." They contrast with related taxonomic categories such as "food," "medications," and "vehicles." Recently, the relationships between such *ad hoc* categories and common taxonomic categories have been investigated experimentally (Barsalou 1982, 1983, 1985a, 1985b).

Barsalou (1983) defines ad hoc categories as categories created spontaneously for use in specialized situations for the purpose of achieving novel goals. He also defines ad hoc categories as a subset of *goal-derived* categories. The latter include frequently used as well as novel categories that are constructed to achieve goals (Barsalou 1985a). His research indicates that, as with common taxonomic categories, ad hoc categories exhibit a graded structure. That is, the degree of consensus among individuals about prototypicality is fairly high and about the same as that of taxonomic categories. Unlike common categories, however, overall family resemblance does not determine prototypicality. Rather, a few goal-related attributes structure the category. For instance, Barsalou (1983) found that "things not to eat on a diet" had very few attributes in common, other than being edible and high in calories. More specifically, similarity to the "ideal" category member and frequency of instantiation were found to be predictive of prototypicality for both taxonomic and ad hoc categories. Family resemblance was predictive only for taxonomic categories (Barsalou 1985a).

The implications of ad hoc categories for consumer behavior pertain mostly to memory, and they will be discussed in that context in the final section of this article.

Specific Research Hypotheses

Research hypotheses regarding cognitive structure are presented in Exhibit 2. Three related trends emerge. First, increased product familiarity should make finer discriminations possible. More subcategories below the basic level should be learned, and properties of the basic level, such as the relative ease and spontaneity of categorization, should shift to more specific levels of categorization. Second, the internal representations of products should become more complete as product familiarity increases. More categories above the basic level and atypical, as well as typical, products should be represented. Finally, as important causal relations are learned, there is an increased ability to represent products in terms of deep, rather than surface, structure.

These changes in cognitive structure are most likely to affect consumer behavior by changing the ways in which decisions are framed. In particular, there should be significant differences between novices and experts in the size and composition of the set of alternatives they consider and in the nature of the attributes that are used to evaluate those alternatives. Our subsequent discussions of analysis, elaboration, and memory illustrate how these differences in cognitive structure can combine with differences in information processing to produce these and other effects on consumer behavior.

ANALYSIS

Degree of analysis refers to the extent to which consumers access all and only the information that is relevant and/or important for a particular task. Although analysis is usually a matter of degree, we frequently will

[3]There is recent evidence that graded structure can be rather sensitive to the influence of contextual factors such as the salience of various retrieval cues or the "point of view" adopted during information processing (Barsalou 1985a, 1985b; Barsalou and Sewell 1985; Roth and Shoben 1983). Thus, the determinants of graded structure may need to be expanded to include contextual factors such as point-of-purchase information or the usage situation.

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EXHIBIT 2

COGNITIVE STRUCTURE: SPECIFIC RESEARCH HYPOTHESES

Summary of hypotheses
2.1 Consumers initially categorize products at the basic level; therefore, increased product familiarity results mainly in an increased ability to categorize products at levels both above and below the basic level.
2.2 The basic level itself becomes more specific as consumers learn to make finer discriminations between brands.
2.3 Because products are spontaneously categorized at the basic level and the basic level becomes more specific with experience, experts confuse brand-specific information less often than do novices.
2.4 Product categorization by novices is more influenced by perceptual attributes than it is for experts.
2.5 The development of more abstract levels of categorization above the basic level makes diverse brands more comparable for experts than for novices.
2.6 When the need is specific, experts consider a more homogeneous set of alternatives than do novices; when the need is general, experts consider a more heterogeneous set of alternatives than do novices.
2.7 Category structure is more veridical, more complex, and less stereotyped for experts than for novices.
2.8 Novice consumers are aware of many prototypical brands but relatively few atypical brands; expert consumers are aware of both types. Therefore, the evoked sets of experts include more atypical brands than do the evoked sets of novices.
2.9 Brand choices are less influenced by prototypicality for experts than for novices, except when prototypicality or atypicality is valued for its own sake.

simplify the discussion by treating it as a dichotomous variable.

Analytic processing is generally effortful because (1) search (internal or external) extends beyond the most accessible information, and (2) irrelevant information must be ignored or otherwise discounted. The extra effort is likely to be worthwhile whenever the importance of information is not highly correlated with its accessibility and consumers have accurate knowledge about which information is important.

In this section we examine differences between analytic and nonanalytic processing as they pertain to selective encoding, classification, and inference. We should point out that expert/novice differences have not yet been studied in detail in this area except for developmental comparisons of children and adults. In some cases, however, analytic processing requires expertise as a logical prerequisite. Also, as was discussed earlier, product familiarity generally reduces effortfulness and frees up cognitive resources, permitting more analytic processing. Therefore, we hypothesize that product familiarity increases the likelihood of analytic processing.

Selective Encoding

There are two principal activities associated with selective encoding of information. First, there is selective search behavior, which determines the sources of information. Second, the amount or "depth" of analysis allocated to incoming information can be selectively determined.

Selective Search. Of the many issues discussed in this paper, information search has been one of the most frequently investigated within the confines of consumer research (see Bettman 1986). Expertise may be considered a prime determinant of search behavior because of the way it mediates one's ability to learn about products and the cost of doing so.

It is axiomatic that comprehension is a function of knowledge. Because experts possess more highly developed conceptual structures, they are better equipped to understand the meaning of product information. Moreover, the amount of cognitive effort required to achieve any particular level of comprehension is likely to be lower for experts than for novices (cf. Britton, Westbrook, and Holdredge 1978; Johnson and Kieras 1983). Thus, given these higher payoffs and lower costs, knowledgeable consumers are more likely to search for new information prior to making a decision (Duncan and Olshavsky 1982; Johnson and Russo 1984; Punj and Staelin 1983).[4] In addition, expert consumers may seek a greater amount of information about particular product attributes simply because they are aware of the existence of those attributes (Brucks 1985) or because they are more capable of formulating specific questions about them (Miyake and Norman 1979).

Aside from the effects of sheer comprehension, the expert's ability to acquire information is further enhanced by an ability to restrict processing to relevant and important information (cf. Johnson and Russo 1984; Punj and Staelin 1983). Among the many types of product information, novices are more likely to sample the opinions of others (Brucks 1985; Furse, Punj, and Stewart 1984) and "nonfunctional" attributes such as brand name and price (Park and Lessig 1981). In extreme cases, novices may rely primarily on brand familiarity (Bettman and Park 1980). When restricted to functional attributes, novices are less able to limit search to those that are most relevant to the usage sitation (Brucks 1985).

[4]Instances in which experts engage in less search than do novices have also been reported (cf. Furse et al. 1984; Johnson and Russo 1984; Moore and Lehmann 1980; Punj and Staelin 1983). One explanation of this phenomenon is that experts are able to rely on information acquired from previous search activity. Thus, the relationship between knowledge and search still holds: experts engage in more total search, but the amount of search they conduct for any particular decision may be small, depending on factors such as temporal distance between the initial search and the new decision, the rates of technological change and new product introduction, the level of brand loyalty, and so on.

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Depth of Analysis. In addition to its influence on external search processes, knowledge also may affect the extent or "depth" to which consumers process available information (Olson 1980). Because of their inferior ability to comprehend and evaluate product-related facts, novices may find such information to be less useful and less interesting (cf. Anderson and Jolson 1980) and therefore may process it in a more cursory or "top-down" manner (Fiske et al. 1983). For example, a consumer who is facile with computer jargon may evaluate a product's claims about power and flexibility by focusing on and carefully inspecting its specifications. The novice, on the other hand, unable to discriminate relevant from irrelevant and good from bad, may scan the same information, perhaps finding support for the claims in the sheer amount of technical information presented rather than its significance (cf. Alba and Marmorstein 1987; Petty and Cacioppo 1984; Olson 1980). Similarly, novices may focus on and make decisions about complex products based on information concerning the product's generic category (e.g, 35mm camera) while only scanning its accompanying specifications as support for their decisions (cf. Sujan 1985).

In other cases, the novice may comprehend the meaning of the attributes but have no understanding of attribute importance. In such cases the novice may use an unweighted, and therefore nonanalytic, compensatory rule (Park 1976). Alternatively, s/he may attempt to simplify the task by selectively processing a subset of the information (cf. Wright 1975a). However, even then the selection of information may be made nonanalytically; that is, in the process of simplification novices may eliminate attributes from consideration on the basis of expediency rather than importance. Research suggests that when cognitive limitations exist, there is a tendency to discount or ignore important information—provided that the decision task becomes easier as a result (cf. Capon and Kuhn 1980; Russo and Dosher 1983; Shaklee and Fischhoff 1982; Slovic and MacPhillamy 1974). To the extent that low knowledge is a cognitive limitation, either because it lowers comprehension or increases cognitive effort, we speculate that novices are most susceptible to this temptation.

Finally, and perhaps most frequently, novices may behave "analytically" in evaluating and using information, but will apply an importance function that differs from an expert's. In some instances, this will be reflected in the relative persuasiveness of peripheral cues. Whereas experts will put more weight on functional product information, novices may be more influenced by nonproduct information such as a salesperson's opinion (Brucks 1985) or a spokesperson's traits (cf. Petty and Cacioppo 1981). In other instances, both experts and novices may base their decisions on the same set of specific product attributes, but nonetheless will weight them differently. Because novices are less able to understand the importance, implications, and determinance of this information, they are more likely to weight highly those attributes that are easily understood or that have been made salient through promotion (Gardner 1983; Wright and Rip 1980).

In short, even when search is held constant, consumers engage in selective processing. More importantly, novices and experts differ in the amount and types of information they selectively consider.

Classification Processes

Classification is the ability to treat different objects or events as if they were equivalent. This ability is clearly important for many types of consumer information processing. These include the formation of evoked sets, using cutoffs in various decision-making strategies, and making inferences about different types of products. We have already discussed structural aspects of classification in the earlier section on cognitive structure. Now we turn to processing aspects and, in particular, to the role of analytic processing.

Several authors have distinguished between *holistic* and *analytic* classification processes (Brooks 1978; Kemler 1983; Kemler Nelson 1984; Shepp 1983; also see Garner 1974; Jacoby and Brooks 1984; Lockhead 1972; Shepard 1964). Holistic (or nonanalytic) processing refers to classifications that are based on overall similarity. That is, objects are classified together if they are highly similar, and single objects are identified as members of a particular class if their similarity to some memory-based representation of that class is high. Overall similarity is assumed to be a function of all accessible attribute information, *regardless of its importance or relevance for the task.* The memory-based representation of the class may consist of particular, previously encountered instances (or exemplars) or a single prototype that corresponds to the "central tendency" of those instances. (A more complete discussion of the relationship between analytic processing and the nature of memory-based representation is provided in the Appendix. Additional discussions may be found in Alba and Hutchinson 1985 and Cohen and Basu 1987.)

Analytic classification is assumed to be rule-based in the sense that particular attributes or attribute configurations that are diagnostic of class membership are the sole basis for classification. Irrelevant attributes are assumed to have no effect. The rules may be explicit hypotheses maintained in memory, or they may be implicit in the selective attention given to certain attributes.

To illustrate this distinction, recall the Ford advertising campaign in which the extreme quietness of the LTD was compared with that of the Mercedes-Benz. Presumably, Ford's strategy was not to induce Mercedes-Benz owners to switch to a Ford. Rather, they hoped to position the LTD as an affordable luxury car instead of a relatively expensive domestic standard. There are two distinct ways in which this effect might

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be achieved. First, analytic processing of the ad might increase the perceived importance of quietness as an attribute of luxury cars and establish the fact that the LTD is a quiet car. Subsequent analytic classification, therefore, is more likely to result in the perception of the LTD as a luxury car. Alternatively, holistic processing of the ad might result in an increase in the perceived similarity between the LTD and the Mercedes-Benz, a known luxury car. Not just quietness, but irrelevant similarities such as the setting, the socioeconomic class of the driver, and even the colors of the cars, might contribute to this effect. Thus, on the basis of its overall similarity to a Mercedes-Benz, holistic processing during classification also should lead to the judgment that the LTD is a luxury car.

Holistic and analytic processing do not always yield the same results, however. For instance, assume the comparison in the LTD ad was with the Chevrolet Caprice. Analytic processing should lead to similar effects because the same attribute, quietness, is emphasized. Holistic processing, on the other hand, may very well have an opposite effect. All of the irrelevant attributes now contribute to the perception that the LTD and the Caprice are similar and, therefore, that the LTD is merely another domestic standard (albeit a quiet one). In fact, several authors have found that comparative advertising increases the perceived similarity between mentioned brands more than noncomparative advertising, even though it is no more effective in changing brand attitude (Gorn and Weinberg 1984; Walker, Swasy, and Rethans 1986). Thus, holistic processing provides at least one explanation for the success of "association" strategies in comparison advertising (cf. Wilkie and Farris 1975). Similarly, "copy-cat" strategies in new product development should be more effective when processing is holistic.

There is considerable evidence that experience increases analytic processing and decreases reliance on holistic processing. First, there are many developmental studies that indicate that younger children typically perform classification tasks holistically and that older children and adults perform them analytically (Shepp 1978, 1983; Smith and Kemler 1977).

Second, recent experiments by Foard and Kemler Nelson (1984) have demonstrated that training on a task that requires attribute analysis transfers to other tasks that require analytic processing of the same attributes. This result is important because, as Foard and Kemler Nelson point out (also see Chi and Ceci 1985), it suggests that the well-established developmental results are a function of accumulated experience in analyzing particular attributes and not a function of simple maturation (which would limit the implications for consumer knowledge considerably). Foard and Kemler Nelson also found that exposure to attribute information, per se, was not sufficient to increase analytic processing. Rather, the training tasks were effective only if they also required analysis. Thus, product familiarity may not increase analytic processing unless many of the product-related experiences involve analytic processing (also see Gaeth and Shanteau 1984). This research also suggests that improvements in the ability to analyze attribute information are specific to the attributes involved in previous analytic processing. Therefore, this type of expertise is likely to be specific to particular product domains.

Third, analytic processing is inhibited by factors that reduce the availability of cognitive resources, causing people to "revert" to holistic processing in such situations. This effect has been demonstrated for time pressure (Ward 1983), stimulus complexity (Smith 1981), and even simple instructions to "report first impressions" rather than "be meticulous" (Kemler Nelson 1984). In fact, several authors have hypothesized that holistic processing is frequently automatic and occurs even when subsequent analytic processing takes place (Lockhead 1972; Smith and Kemler Nelson 1984; Ward 1983).

As was discussed earlier, product familiarity should, in general, reduce cognitive effort and free up cognitive resources. Therefore, in complex tasks familiarity may reduce the resources required for some components, making them available for analytic processing. There is, however, evidence that some types of analytic processing may be automatic (Reber 1976; Reber and Allen 1978). This research is controversial and, even if shown to be valid, is a clear exception to the more general result. (A fuller discussion of the relationship between analytic processing and automaticity is provided in the Appendix.)

Finally, when attribute information is acquired from experiences that do not involve classification per se (i.e., incidental rather than intentional learning), subsequent classification is characterized by holistic processing (Brooks 1978; Kemler Nelson 1984; Reber 1976). On the other hand, when information is acquired from experiences that explicitly involve classification (i.e., intentional learning), subsequent analytic processing is much more likely (Kemler Nelson 1984; cf. Lewis and Anderson 1985; Martin and Caramazza 1980). Exposure to advertising requires very little classification other than spontaneous object identification (which as we noted earlier is likely to be at the basic level). Product usage entails some degree of functional classification. That is, consumers must determine which of their possessions can be used to accomplish their daily goals. This, too, is likely to consist of basic level classifications. Neither of these types of experiences typically requires any explicit classification of competing brands. Thus, most routine processing of product-related information affords few opportunities for improving analytic ability.

On the other hand, nonroutinized shopping, decision making, and purchasing behavior require exactly the sort of brand-level classification that should result in improvement. Even here, however, the consumer must be motivated to be analytic. (Recall the effect of "report

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first impressions" vs. "be meticulous" instructions.) Moreover, if consumers are not motivated to be analytic in their decision making, even numerous experiences may result in little improvement (cf. Foard and Kemler Nelson 1984). Thus, purchase decisions for products that are high in cost or that have long-term consequences should provide the most effective product-related experiences for improving analytic processing.

It is also possible that expertise itself influences motivation. Personal experience suggests that highly involved hobbyists in various product domains are naturally motivated to make use of their knowledge. Thus, advertising exposure and product usage for these people may very well result in frequent product classification. For example, photographers frequently must classify films and lenses. Similarly, the conversation at informal wine tastings frequently centers on assigning the tasted wines to various categories.

In summary, analytic, rule-based processing is inhibited, and holistic, similarity-based processing is facilitated, by stimulus complexity, time pressure, lack of motivation, and incidental learning conditions. These factors are typical of many consumer situations. Also, analytic processing is facilitated by previous analytic processing of the same attribute information but not by previous holistic processing of it.

Inference

The third aspect of consumer behavior that can be described in terms of analysis is inference making. In this context, degree of analysis refers to the extent to which the basis for an inference is restricted to causally or logically relevant facts. Nonanalytic inferences are characterized by heuristic connections between known and inferred facts. Because such connections are sometimes causally or logically irrelevant, the validity of these inferences is more probabilistic. It is important to note, however, that the same inference may be made analytically or nonanalytically, depending on the reasoning behind it; that is, the distinction bears more on the process of making the inference than on the inference itself (cf. Fishbein and Ajzen 1975). In this section we discuss inferences that vary in their degree of analysis and in how they interact with expertise. We describe four types of inference: *evaluation-based inference, similarity-based inference, correlational rules,* and *schema-based inference.*

Evaluation-based inferences, better known as halo effects, are evaluative inferences about products and attributes (cf. Beckwith and Lehmann 1975; Cooper 1981; Nisbett and Wilson 1977; also see Landy and Sigall 1974). For example, evaluation of a camera's optical quality may be based on the overall evaluation of the camera; evaluation of the camera itself may be based on feelings about the category of which it is a member (e.g., SLR or Japanese), and so on. When inferences such as these occur as a result of halo, they are considered to be nonanalytic by definition. Halo, as it is used here, refers to the indiscriminant (and perhaps unconscious) transfer of affect from one concept to another. No effort is made to decompose the attitude toward the original concept into its constituent causes or to determine the relevance of those causes to the newly evaluated concept.

Similarity-based inferences are inferred beliefs about one concept that are based on its overall similarity to another concept (cf. Beattie 1982; Fiske 1982; Gilovich 1981; Kahneman and Miller 1986; Read 1983; Sujan 1985). Such inferences are nonanalytic because similarity is based on whatever features happen to be salient at the time of the comparison, which often include noncritical surface features. In a consumer context, overall judgments about an unfamiliar product or inferences about its particular attributes may be based on its similarity to a more familiar exemplar (Cohen 1982; Loken, Ross, and Hinkle 1986). If the similarity is high, consumers may assume that the quality of the less familiar product, its features, or its performance on certain dimensions does not differ substantially from that of the familiar product. In essence, the process involves reasoning by analogy—a process that is ubiquitous (see Sternberg 1977). It is not uncommon for manufacturers to take advantage of its ubiquity by designing their products to be physically similar to higher quality competitors.

Correlational rules represent the final variety of nonanalytic inference. Such rules form when the perceived correlation between two attributes is so high that the presence of one leads to a strong belief about the value of the other (cf. Erickson, Johansson, and Chao 1984; Hoch 1984a; John, Scott, and Bettman 1986)—as in the case of the price–quality inference.

Once a strong rule has been formed, an attribute-to-attribute inference may be made almost automatically. That is, the inference process becomes devoid of reasoning. Rather than constructing a path from the stimulus to the inference, the inference is produced directly from the stimulus and perhaps immediately upon its reception (cf. Anderson 1983b; Smith 1984).

It is not our contention that these three types of inference are the sole domain of novices (see, e.g., Gilovich 1981 and the conclusion of this article) or that they lead necessarily to erroneous beliefs (cf. Cherniak 1984). We do maintain, however, that all things being equal, experts will be more judicious in their use of such heuristics (cf. Downing, Sternberg, and Ross 1985). Specifically, experts should temper halo effects with more detailed evaluation; they should distinguish between relevant and irrelevant features when judging product similarity; they should question the validity of analogical reasoning, in general, taking into account situational factors and base-rate information; and they should be less prone to overinterpret noncausal covariation. In fact, it is likely that, as with nonanalytic classification, nonanalytic inference is most influential

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when conditions inhibit the use of more diagnostic information, such as when involvement is low or information load is high (cf. Buyukkurt and Buyukkurt 1986; Deighton 1983; Downing et al. 1985).

Whereas nonanalytic inferences are easy to generate but may be moderated by product knowledge, other inferences cannot be made at all unless the consumer possesses a requisite amount of such knowledge. In particular, schema-based inferences about a product require knowledge about attribute typicality. For instance, if a product is perceived to be a good instance of a category, it is assumed to possess the typical but not atypical features of the category. In schema terms, these inferred typical features are "default values." Once a product has been categorized, typical attributes that have not been specified, or that have been specified but poorly processed, will be "filled in" with the default values provided by the schema. For example, if a consumer fails to encode or encodes but forgets the price of a product, s/he may infer a price typical for its category, as long as the product itself is not unusual for its class (cf. Crocker 1984; Friedman 1979). Effects such as this are not difficult to produce. In fact, so robust is the phenomenon that producing evidence for typicality-based inference making has almost become a cottage industry (e.g., Arkes and Harkness 1980; Bower, Black, and Turner 1979; Brewer and Dupree 1983; Brewer and Treyens 1981; Cantor and Mischel 1977; *Forbes* 1984; Friedman 1979; Gentner and Loftus 1979; Graesser, Gordon, and Sawyer 1979; Graesser et al. 1980; Smith and Graesser 1981; Snyder and Uranowitz 1980; Whitney and John 1983).

It has also been shown that, in addition to default features, typicality may influence the inferences consumers make about new attributes. When a new property is true of a typical instance of a category, it is often assumed to be true of many other instances. However, new properties of atypical instances will not be generalized to the same degree (Rips 1975). For example, a car shopper may look at the price of a mid-sized family car, experience "sticker shock," and infer that the prices of subcompacts and sports cars have increased proportionally. However, if the shopper looks at a limited-edition Maserati, the tendency to generalize to other cars would not be as great.

We further speculate that the extent of such generalization depends on what the consumer perceives the basic level category to be. The consumer who operates at the basic level of "cars" is more likely to generalize from a fact about a mid-sized family car to most other cars than is the consumer who, at the basic level, distinguishes between mid-sized family cars, subcompacts, luxury cars, and sports cars. To the extent that experts perceive the basic level to be narrower and more specific, they will be less prone to overgeneralize from a particular exemplar.

Nonetheless, even for experts, schema-based inferences may lead to the formation of erroneous beliefs, i.e., the default values may be overapplied (cf. Arkes and Harkness 1980). In a perfect world, a superordinate concept would specify the necessary and sufficient criteria for membership in that category. Consequently, knowing that an exemplar is a member of a particular category would guarantee that the exemplar possesses certain features. However, concepts do not specify necessary and sufficient criteria (Medin and Smith 1984; Rosch 1978; Smith and Medin 1981). Instead, one is forced to rely on typicality when inferring the attributes of a category exemplar. Though such inferences are likely to be more valid than similarity-based inferences, people nonetheless may exaggerate the correlational structure in the world and thereby may incorrectly assume that attributes true of most members of a class are true of all members of that class. The result is that knowledge about particular members becomes stereotyped and distinctions across members become blurred. Thus, even within the domain of analytic thought, inferences can vary in terms of their veridicality. The extent to which consumers will not overgeneralize depends in part on the situational constraints, the effort required, and how precisely they differentiate products. However, because experts know more facts and categorize objects in ways that reflect the complexities present in the world (cf. Fiske et al. 1983; Murphy and Wright 1984; Weber and Crocker 1983), they should be less prone to stereotyping. Of course, at very low levels of product familiarity, novices lack the ability to make typicality-based inferences and, therefore, stereotyping errors.

Finally, it should be noted that the issue of veridicality is not restricted to inferences consumers make about the existence of unstated product attributes. Through the process of negative induction, a consumer may infer that a product lacks a particular attribute based on his/her lack of familiarity with that attribute. Experts are most likely to make such inferences (Gentner and Collins 1981). Though negative induction can be a useful heuristic, consumers who consider themselves to be experts may assume incorrectly that a product does not possess a certain feature simply because they are not aware of its existence.

Specific Research Hypotheses

Research hypotheses regarding analytic processing are presented in Exhibit 3. Degree of analysis was defined as the extent to which consumers access all and only the information that is relevant and/or important for a particular product-related task. The properties of analysis were reviewed for three fundamental types of information processing: selective encoding, classification, and inference.

Three important general properties of analytic processing emerge. First, analytic processing results in superior task performance. Nonanalytic processing results in acceptable levels of performance, but it is also

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EXHIBIT 3

ANALYSIS: SPECIFIC RESEARCH HYPOTHESES

Summary of hypotheses	
Selective encoding	
3.1	Experts are more likely than novices to search for new information because product familiarity reduces the cost of acquiring information and increases awareness of information that is potentially acquirable.
3.2	Experts are more able than novices to restrict acquisition to relevant and important information.
3.3	Experts process information more deeply in order to identify that which is relevant and important; once identified, this information is processed more extensively than information that is irrelevant or unimportant.
3.4	When novices process information selectively, they are more likely than experts to select information based on expediency rather than relevance or importance.
3.5	When novices process information selectively, they are more likely than experts to select peripheral cues for extended processing.
3.6	Even when experts and novices base their decisions on the same set of product attributes, novices are more likely to weight highly those attributes that are easily understood or have been made salient through promotion.
Classification processes	
3.7	Experts are more likely than novices to engage in analytic classification, and novices are more likely than experts to engage in holistic classification.
3.8	Product-related experiences that require attribute analysis facilitate subsequent analytic processing of the same attributes.
3.9	Exposure to attribute information per se does not facilitate subsequent analytic processing of the same attributes.
3.10	Time pressure, information complexity, and low motivation inhibit analytic processing; however, because product familiarity generally reduces cognitive effort and frees up cognitive resources, these effects are greater for novices than for experts.
3.11	Purchase experiences are more likely than product usage or advertising exposures to induce analytic classification; therefore, they have a greater facilitative effect on subsequent analytic processing.
3.12	Relative to novices, experts are more likely to classify brands spontaneously and are more motivated to process information analytically, thereby providing the types of product-related experiences that facilitate subsequent analytic processing.
Inference	
3.13	Novices are more likely than experts to rely on nonanalytic inferences (especially evaluation-based and similarity-based inferences).
3.14	Experts are more apt to rely on nonanalytic inferences when conditions inhibit the use of their knowledge, such as when involvement is low or information load is high.
3.15	Schematic knowledge allows consumers to infer the presence of typical product attributes (and the absence of atypical attributes) when such information is not explicitly available.
3.16	Schematic knowledge allows consumers to infer that new information about typical brands (but not atypical brands) generalizes to other brands in the product class.
3.17	The generalization of new information does not extend beyond the basic level; therefore, because the basic level becomes more specific with expertise (see 2.2), novices are more likely than experts to overgeneralize new product-related information.
3.18	Experts are less prone than novices to make inferential errors as a result of stereotyping; however, consumers with very little product familiarity may lack the knowledge necessary to make any schema-based inferences, correct or incorrect.
3.19	Experts are more likely than novices to believe that a product does not have a certain attribute simply because they are not aware of its existence.

strongly biased by the relative accessibility of information. Second, analytic processing is effortful and consumers must be motivated to engage in analytic processing. Nonanalytic processing is less effortful and may occur regardless of the level of motivation. Thus, the benefits of analytic processing carry a cost in terms of cognitive effort. This cost, however, is reduced by experience. Finally, the types of experiences that facilitate subsequent analytic processing must themselves involve analytic processing. Taken together, these properties suggest that motivation is a key antecedent for improvements in analytic processing; product familiarity alone is not sufficient.

ELABORATION

As implied in the previous section, the inferences consumers make about a product can have a significant impact on attitude, judgment, and choice (also see Fishbein and Ajzen 1975; Huber and McCann 1982; Lynch and Srull 1982; Olson 1978). However, the effects of expertise cannot be described solely in terms of analysis. Inferences also vary in terms of their elaborateness. As defined here, elaboration refers to the number of intervening facts that must be computed in order for an inference to be made. The role knowledge plays in elaboration is to provide a route from the given infor-

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mation to the inference. In some cases, knowledge results in a more direct and/or veridical route; in other cases, knowledge affects the likelihood that an inference will be made at all. We will discuss three broad categories of inference: interpretation, embellishment, and problem solving. In order, they are generally associated with increasing amounts of elaboration.

Interpretive Inferences

Interpretive inferences are inferences that merely express the probable intent of an assertion; thus they serve no embellishment function. In fact, when properly made they are equivalent to the intended meaning of the assertion. Their role is to facilitate communication by eliminating the need to meticulously spell out the meaning and implications of every word and phrase. Thus, they allow swifter and more elegant discourse. However, even though they represent the lowest level of elaboration, their ease and accuracy are determined in large part by consumer expertise.

Coherence Inferences. Coherence inferences establish associations between presented facts. The associations may be referential or causal. In order to perceive referential coherence, the consumer must understand how one idea refers to another. For example, consider the following statements:

1. Brand X offers an integrated stereo system.
2. The turntable is of very high quality.

In this example, an inference, albeit a very simple one, is required to understand that the turntable described in the second statement refers to a component of the system described in the first. The stereo novice may lack this knowledge and fail to make the connection. If so, the two facts will appear unrelated, and the message as a whole will make little sense (cf. Haviland and Clark 1974).

Recently, Keenan, Baillet, and Brown (1984) have noted that referential coherence is necessary but not sufficient to guarantee comprehension. Causal coherence may also be required. For causal coherence, it is necessary to understand that the information in one idea enables assertions made in subsequent ideas to be possible. Consider statements 3 and 4.

3. The turntable possesses a microcomputer and infrared optical sensor.
4. You can play 10 cuts per side in any order.

A knowledgeable person understands that 10 cuts can be played in any order because the microcomputer controls the sequence of arm movements and the infrared sensor indentifies each cut. A novice's conceptual structure may not contain these facts. As in referential coherence, knowledge permits a link between the ideas to be formed, which in turn facilitates comprehension.

If the connection between two facts is not immediately apparent, previously stored information in memory may be scanned in an attempt to find one. If one cannot be found, a reasonable one may be inferred (see, e.g., Keenan and Kintsch 1974). In the process, however, the consumer may generate inferences that are unwarranted (Mandler and Johnson 1977; Meyers and Boldrick 1975; Thorndyke 1977). For example, from statements 1 and 2 a consumer might infer that "integrated stereo system" is a synonym for turntable. Thus, the accumulation of factual knowledge not only decreases the effort required to establish coherence but also increases the likelihood that the inferred relation is veridical.

Pragmatic Implication. Pragmatic implication concerns the semantic and logical interpretation of comprehensible facts. Typically, an assertion implies more than it literally states. As with coherence, this usually has the salutary effect of making discourse more efficient. However, it is easy to construct cases in which the literal meaning of an assertion is true but its implication is not. It is this negative side of pragmatic implication that most concerns consumer research because of its obvious relevance to deceptive advertising.

Examples of advertising-related misinterpretation are widely available (e.g., Funkhouser 1984; Harris 1977; Harris and Monaco 1978; Jacoby and Hoyer 1982; Jacoby, Nelson, and Hoyer 1982; Shimp and Preston 1981; Russo, Metcalf, and Stephens 1981). For example, consider statements 5 through 9.

5. Brand X relieves the problems of hemorrhoids.
6. Brand X may help you sleep better.
7. Brand X gives you a whiter wash.
8. Are you tired of low-quality performance? Try Brand X.
9. Brand X dog food has more milk protein than any other brand.

Statement 5 may be interpreted to mean that Brand X cures hemorrhoids (Preston 1977); statement 6 could be interpreted as a certainty rather than a probability (Harris 1977); statement 7 is a meaningless comparative that may be interpreted as comparing Brand X with every other brand (Harris 1977); the sentences in statement 8 are intended to mean that Brand X is not of low quality, though it need not be (Harris 1977); and statement 9 implies that milk protein is better than other protein, though this is doubtful (Preston 1977).

Thus, a consumer's interpretation of a simple assertion may be at variance with both its literal meaning and the true state of affairs. It has also been shown that pragmatic implication can outweigh logical necessity when the assertions take on a more formal structure (Geis and Zwicky 1971; Preston 1967; Preston and Scharbach 1971). Consider the following:

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10. John Doe, famous photographer, uses Brand X cameras. Doe is the winner of many photography awards.

    Interpretation: Doe wins awards because of the camera he uses.

11. If a camera is good, then it must be imported (i.e., all good cameras are imported). Brand X is imported.

    Interpretation: Brand X is good.

12. If you buy Brand X, which has special feature Y, your photography will improve.

    Interpretation: If you do not buy Brand X, your photography will not improve.

In each example the interpretation is pragmatically but not logically implied. In example 10, a causal relation is inferred from mere juxtaposition (called the *post hoc ergo propter hoc* fallacy). In 11 and 12, the classic violations of conditional reasoning known as affirming the consequent and denying the antecedent, respectively, are committed. Example 12 is of special concern to regulators because it contains an unwarranted implication about a product's uniqueness (Preston 1977).

The pragmatic inferences in all of these examples are very natural and result from the way we use language and the trust we place in other people to be truthful (cf. Grice 1975). In fact, for many utterances, interpretation is an almost unavoidable consequence of processing (cf. Harris 1977; Harris, Teske, and Ginns 1975). Consequently, misleading assertions are particularly seductive. The problem is compounded by the generally low ability people have to recall an utterance verbatim (e.g., Bransford, Barclay, and Franks 1972; Brewer 1975; Jarvella 1979; Sachs 1974; but see Alba and Hasher 1983 and Jacoby and Brooks 1984). Indeed, some deceptive practices owe much of their success to the dual processes of misinterpretation and forgetting.

Fortunately, expertise again may play a moderating role. That is, it may prevent a consumer from forming an erroneous interpretation or accepting an erroneous conclusion. For example, factual knowledge may prevent a consumer from interpreting "relieves" as "cures," or thinking that milk protein is better than other types. Similarly, an expert would appreciate the relative importance of camera equipment vis-a-vis sheer artistic talent in winning a contest, and would know that there exist imported cameras that are not very good (cf. Bucci 1978; Griggs and Cox 1982; Pollard 1982). And in each example, specific knowledge of the brand would allow the consumer to deny the veridicality of the implication if it is incorrect.

Simplification. Some interpretive inferences represent simplified, or less precise, restatements of a fact or set of facts. They are of particular interest to consumer research when they have an evaluative connotation. Simplification is hypothesized to occur at either of two levels: (a) at the same level of abstraction as the nominal fact, and (b) to a higher level of abstraction. An instance of the former occurs when people infer statement 14 from 13.

13. Car X goes from 0 to 60 mph in 7.5 seconds.

14. Car X has rapid acceleration.

An instance of the latter is when 15 is taken to mean 16.

15. Bicycle X has a high gear ratio and alloyed components.

16. Bicycle X is a fast bicycle.

Note that simplifications may be objective, as in 14, or affective, as in 17 (cf. Kintsch and Young 1984).

17. Car X has very good acceleration.

In each case, the interpretation contains less semantic detail than the fact(s) from which it was derived. Importantly, however, each interpretation contains an evaluative or attitudinal component not explicit in the message. Thus, unlike pragmatic interpretation, simplifications may be more idiosyncratic. They are based not so much on the conventions of language as on the way each individual personally evaluates attribute information.

The role of knowledge in simplification is not entirely clear. Knowledge should increase the accuracy of the simplifications that are made. Its effect on production likelihood needs to be determined empirically. Assuming minimal levels of knowledge, all consumers may generate obvious simplifications virtually automatically, as in statements 13 and 14. For less obvious inferences, expertise should allow for interpretive simplification to occur more effortlessly. If a consumer does not understand how gear ratio and alloyed components relate to bicycle speed, an evaluative simplification about speed may not be made. On the other hand, even when knowledge is low, consumers may attempt to generate simplifications, tenuous as they may be, in an attempt to understand the gist of an otherwise incomprehensible message (cf. Kozminsky, Kintsch, and Bourne 1981). Obviously the likelihood of misinterpretation is much higher in such cases.

Reliance on interpretive simplifications should be extensive for all consumers, but proportionally more so for novices (Brucks et al. 1984). Research indicates that abstract stimulus information as well as internally generated judgments may be more stable, or memorable, than the details upon which they are based (cf. Alba and Ofir 1985; Brewer and Dupree 1983; Carlston 1980; Christiaansen 1980; Kintsch and van Dijk 1978; Lingle et al. 1979; Lingle and Ostrom 1979; Neisser 1981). As we will discuss later, however, novices recall fewer details than do experts. Thus, all things being equal, novices may be more reliant on their simplified interpretations when making a memory-based decision.

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Embellishment

Whereas an interpretation expresses the perceived meaning of an utterance, other inferences embellish a message by adding information to it. In most cases, embellishment requires more elaboration than does interpretive inference. Of course, one role that expertise may play is to make embellishment unnecessary. If a fact is known, it need not be inferred. However, when inference is required, expertise typically makes it easier and more likely to be generated.

All of the inferences discussed in the context of analysis can be considered embellishments inasmuch as they involve generalization from an object, relationship, or schema. However, such inferences are relatively tenuous and result from simple retrieval or comparison processes. Thus, they do not require much elaboration, other than the validity checks experts may apply (see previous discussion).

In the remainder of this section we describe types of embellishment that are less probabilistic (in that they are based on causal or logical relations) and that may be chained together in the form of complex reasoning.

Causal Inferences. With regard to causal relations, a distinction can be made between functional and enabling inferences. Functional inference involves making an inference about an outcome on the basis of its functional determinants (Collins et al. 1975). In consumer terms, this may mean inferring a benefit from a feature. Differences in advertisements aimed at different segments are quite apparent in this regard. Messages directed at camera experts, for example, often stress technical features because it may be assumed that the target audience (1) is able to infer all of the related benefits, and (2) finds a technical description to be more convincing than unsupported claims. Moreover, the same set of technical features can imply a large number of specific benefits, and experts are able to infer the ones that are most important to them personally. Physical features may be meaningless to novices, so advertisements directed toward them are structured around easily comprehended benefits. In a sense, novices need to have the implications (or conclusions) of a message drawn for them (cf. McGuire 1969).

Enabling inferences represent the inverse of functional inferences in that they cause beliefs about functional determinants, or enabling conditions, to be formed on the basis of outcomes (e.g., Arkes and Freedman 1984; Hildyard and Olson 1978; Owens, Bower, and Black 1979; Thorndyke 1976). That is, features may be inferred from benefits. For example, a fact about fuel economy may lead to an inference about engine size, or a fact about breath protection may lead to an inference about germ-killing ability (Mazis and Adkinson 1976). Note that the causal path from benefit to feature is likely to be less certain than the opposite case, especially with rapidly changing technology. Thus, on a percentage basis, enabling inferences may be made incorrectly more often than functional inferences.

Transitive Inference. Other embellishments result from pure deduction. Here we consider a form of logical reasoning that may be particularly relevant to consumer behavior—that is, transitive inference. As an example, a wine novice might learn that Cabernets are generally "bigger" than Pinot Noirs (where "bigness" refers to the amount of flavor, body, and alcohol in the wine). Later, s/he might learn that Pinot Noirs are generally bigger than Zinfandels. From this information s/he can infer that Cabernets are bigger than Zinfandels. Gradually, a complete ordering of wines in terms of bigness could be constructed (i.e., the bigger wine is known for all possible pairs). In most cases this information will be encountered randomly and the novice consumer will be limited, at best, to a partial ordering. For example, the above-mentioned novice may next learn that Merlots are bigger than Pinot Noirs. S/he may infer that Merlots are also bigger than Zinfandels, but the relation between Cabernets and Merlots is indeterminate.

The cognitive effort required to make comparative judgments of this type is determined in part by the completeness of the ordering. There is considerable research demonstrating that judgments based on partial orderings are much more difficult than judgments based on complete orderings (Hayes-Roth and Hayes-Roth 1975; Smith and Mynatt 1982; Warner and Griggs 1980). Also, it is surprisingly difficult to add new items to an existing ordering (Potts, Keller, and Rooley 1981). Once the complete ordering has been acquired, however, processing becomes much easier. In some sense, the entire ordering is represented in memory, and simple retrieval and comparison operations replace the more effortful transitive inferences.[5] Thus, as expertise increases, comparative judgments should be made more rapidly and accurately.

Implications. A major issue concerning inference is its veridicality. Except for pure logical deduction, all inferences are of indeterminate validity until they are verified with additional information. However, by their nature, inferences are typically assigned a greater-than-

[5]The reason for this seems to be that people do not have well-established "schemas" for partial orderings. When such schemas are provided, processing may become very efficient even for partial orderings (e.g., Griggs and Warner 1982; Moeser 1979; Moeser and Tarrant 1977; Smith and Mynatt 1982). It is a matter of some controversy whether the internal representations of complete and partial orderings or the processes that operate on them are fundamentally different (see Hayes-Roth and Hayes-Roth 1975, Holyoak and Gordon 1984, Rips and Stubbs 1980, and Taylor, Kim, and Sudevan 1984, as well as the references cited earlier). For most product attributes, a complete ordering is possible, in principle, and the interim partial orderings depend on the order in which information has been acquired. Therefore, these partial orderings are likely to be rather arbitrary. All research investigating partial orderings under such conditions has found that information processing is significantly more difficult than would be the case for a complete ordering.

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chance truth probability. That is, when a consumer infers a product feature, s/he is implicitly stating that product X probably possesses attribute Y. As noted repeatedly, the danger of such inferences is that they can be erroneous due to the lack or inappropriate use of prior knowledge.

The danger of inaccurate embellishment is compounded by the fact that the consumer may forget the source of the embellishment. That is, the consumer may not recall whether the embellishment was acquired from an external source or was inferred. Unfortunately, when the source of an internally generated piece of information cannot be recalled, there is a tendency to err in the wrong direction. That is, people attribute the information to an external source (Johnson et al. 1981). In some cases, an inference may be attributed to a specific, high-credibility source. In other cases, the inference may be treated as any other piece of stored information. As Collins et al. (1975) note, people are prone to believe that they do not store false information. Hence, misinterpretations and inaccurate embellishments—whether honestly made or fostered by an unscrupulous promoter—may be treated as valid information.[6]

One's ability to remember the source of an inference depends on, among other things, the amount of elaboration that was required to generate it (see next section). Inferences that are generated easily and naturally, such as interpretive and nonanalytic inferences, require little elaboration and are most difficult to discriminate from external information (cf. Winter and Uleman 1984); inferences that result from a reasoning process are most easily identified as having been self-generated (cf. Alba 1984; Johnson and Raye 1981). For all inferences, source discriminability decreases as time passes (Hertel 1982; Spiro 1980) and as interference grows (Brockway, Chmielewski, and Cofer 1974). Paradoxically, however, when expertise reduces the amount of effort required to generate an inference, it also may increase the likelihood of source confusion (and, therefore, overconfidence in the validity of the inferred fact).

Problem Solving

Problem solving presents an almost unlimited potential for elaboration. In our brief discussion we will focus on the way consumers represent problems and the qualitative differences that may exist in terms of solution strategy.

[6]In an analogous way, the precise source of the externally obtained information may also be difficult to retrieve (see, e.g., Schacter, Harbluk, and McLachlan 1984). Thus, for similar reasons, external information of uncertain origin may also be assigned an undeservedly high level of validity. The likely outcome is consistent with the classic sleeper effect, and our reasoning is consistent with the dissociative cue hypothesis often used to explain it (Cook et al. 1979).

The ability to solve problems is partially determined by one's prior experience and knowledge (Holyoak 1984; Sternberg 1986; Weisberg and Alba 1981). In situations in which a problem is familiar, prior experience may lead to the direct retrieval of a prior solution—as in the case of routinized problem solving (Howard and Sheth 1969). In situations in which the problem is new, expertise allows an individual to generate and evaluate potential solutions (cf. Voss, Vesonder, and Spilich 1980).

In the consumer context, the problem is a need and the solution is a need-satisfying product. An important first step in solving any problem involves understanding the nature of the problem (cf. Gick and Holyoak 1983; Sweller and Levine 1982). In some cases the surface features of the problem are diagnostic, and expertise allows one to use these features to identify the problem and apply an appropriate solution (Lewis and Anderson 1985). In other cases the surface features are nondiagnostic, and expertise is required to classify the problem in terms of its deep structure (cf. Adelson 1984; Chi, Feltovich, and Glaser 1981; Chi, Glaser, and Rees 1982; Schoenfeld and Herrmann 1982). Thus, experts are also more analytic than novices as problem solvers.

For consumer problems, an analogous situation exists. For example, consider the problem of tendonitis. A novice may fail to discriminate between this pain and headache pain (i.e., s/he places them in the same category) and, as a result, may decide to take acetaminophen. A knowledgeable consumer may identify the problem as pain caused by inflammation and decide to take aspirin because of its anti-inflammatory properties. A physician may make the same or an even subtler distinction and prescribe a drug that is unfamiliar to either consumer. In each case, expertise affects the solution. The three individuals differ in their ability to differentiate one cause of pain from another (i.e., in how well they define the problem) and in their knowledge of medical treatments that are pertinent to each cause.

Thus, by helping to identify the root cause of a problem, expertise often leads to a faster (and better) solution. In other cases, however, it has an opposite effect. That is, it reduces the likelihood that a truly difficult problem will be oversimplified (Voss et al. 1983). Experts are more likely to appreciate the complexities of a problem and are better equipped to deal with them. For example, consider a consumer shopping for financial investments. The novice may investigate various options, selecting the one with the highest current rate of return. Experts are more likely to consider other factors such as risk, security, stability, tax implications, and so on, because they possess well-developed conceptual structures and/or they find it less effortful to deal with such information.

Finally, research on problem solving has shown that even when novices achieve a correct solution, the procedure they follow is likely to be less efficient than the

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one used by experts. Perhaps because they lack a true understanding of the problem's deep structure or how given information pertains to the solution, novices are less likely to reason directly from the problem state to the solution state. Instead, they are more likely to reason backwards from the goal or decompose the problem into subproblems, some of which may be irrelevant (Larkin et al. 1980; Sweller, Mawer, and Ward 1983).

In consumer problem solving, analogous results may obtain. Consider, for example, a budding photography hobbyist shopping for camera equipment. Instead of reasoning from the problem (defined in terms of the type and quality of picture desired) to the solution (the precise equipment that would satisfy those desires), the novice may buy many of the products normally associated with good picture-taking. And although the purchased goods may include everything this consumer needs, it may also include camera modes, lenses, and filters that will never be used. This also suggests that novices are more susceptible to the influence of external factors, such as the display of items in a store, and are less likely to arrive at creative solutions involving nonobvious substitute products (Hirschman 1980b).

Thus, in some cases novices may select an incorrect solution; in other cases they may select a correct but inefficient solution.

Specific Research Hypotheses

Research hypotheses regarding elaboration are presented in Exhibit 4. Combined with information from the previous section, it can be asserted that experts are more likely than novices to elaborate on given information and to do so accurately. Moreover, holding accuracy constant, expertise leads to easier and more efficient information processing.

For example, expertise allows a consumer interpreting stimulus information to comprehend almost effortlessly how one assertion is related to another, to reject inappropriate pragmatic implications, and to simplify the meaning of a message easily and accurately. Expertise enhances a consumer's accuracy in generating product beliefs by increasing the likelihood of analytic thought and by reducing overgeneralization from known facts. It increases efficiency by allowing inference to substitute for search and by enabling the consumer to comprehend easily the benefits of product features. Expertise allows the consumer solving a problem to identify its cause accurately and to avoid oversimplification of its solution. Efficiency of the process is increased by the expert's ability to generate solutions internally and to avoid purchase of unneeded products or product features.

Experts enjoy these advantages as a result of their greater factual knowledge, more highly differentiated knowledge, and superior analytic skills. From the standpoint of a message sender, these characteristics suggest that it is easier to communicate veridical information to experts and more difficult to deceive them.

EXHIBIT 4

ELABORATION: SPECIFIC RESEARCH HYPOTHESES

Summary of hypotheses	
	Interpretive inferences
4.1	Prior knowledge increases the ease with which coherence is established, thereby facilitating comprehension of product-related messages.
4.2	Prior knowledge increases the veridicality of inferences that are generated to establish coherence.
4.3	Prior knowledge prevents consumers from accepting erroneous pragmatic implications of advertising claims that are technically true.
4.4	Prior knowledge increases the accuracy with which product-related information is simplified by the consumer.
4.5	When information is technical, prior knowledge facilitates the generation of simplifications.
4.6	Reliance on simplifications rather than complete information is proportionally greater for novices than for experts.
	Embellishment
4.7	Experts are more able than novices to infer intended product benefits from technical information and to infer likely technical causes of claimed benefits.
4.8	Memory for whether product information was inferred or externally provided is worse for experts than for novices.
4.9	As product familiarity increases (and more pair-wise brand relations are learned), partial orderings are replaced by complete orderings of brands, making memory-based brand comparisons easier and more accurate.
	Problem solving
4.10	Novices are more likely than experts to represent a consumer problem—i.e., choosing a product that best satisfies a need—in terms of its surface structure and less likely to represent it in terms of its deep structure.
4.11	Novice problem-solving is more influenced by external factors such as point-of-purchase information than is expert problem-solving.
4.12	Novices are more likely than experts to oversimplify complex problems and/or ignore hidden complexities in apparently simple problems.
4.13	Novices are more likely than experts to be inefficient problem solvers; consequently, they will more frequently purchase unnecessary goods and/or features.

MEMORY

The final dimension of consumer expertise that we will discuss is memory. In particular, we examine the likely effects of product familiarity on memory for specific product information. Obviously, a general treatment of all forms of memory is well beyond the scope

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of this paper. Therefore, we have focused on the long-term retention of *verbal* information.[7]

There are many ways in which the literature on verbal memory might be organized. We have chosen to distinguish between memory for simple information (e.g., words) and more complicated information (e.g., facts, sentences, prose passages, etc.). This distinction reflects clear differences in experimental paradigms as well as likely areas of investigation in consumer research. Thus, we will initially focus on the processes of brand name recognition and recall. We then will discuss memory for more complicated product information such as advertising messages.

Memory for Simple Information

Two types of memory for simple information are especially important in consumer contexts: brand name recognition (or identification) and brand name recall (cf. Baker et al. 1986). Each of these will be discussed in turn.

Brand Name Recognition. When consumers quickly scan a typical supermarket shelf display, they are exposed to a large number of brand names that are embedded in an even larger number of nonbrand, product-related words. It seems likely that only a small proportion of these words are even read. As was discussed earlier, repeat purchases by brand loyal consumers may be guided by automatic visual search processes that require only package identification. On the other hand, a new or infrequent purchase, such as buying a cold remedy, may require at least brand name recognition for the brand to be considered. Therefore, it is reasonable to expect that the ease of reading brand names affects which brands are considered.

Direct research on in-store processing of verbal information is rare (cf. Hoyer 1984; Russo et al. 1986). However, there is an extensive cognitive literature on word recognition in laboratory settings. Word recognition experiments typically present words in some perceptually degraded fashion (e.g., visually masked, extremely brief exposure, with missing letters, etc.) and require subjects to read the word aloud or simply indicate whether it is an actual English word.[8] It seems plausible that the perceptual processes involved in such tasks are quite similar to those involved in quickly scanning a store shelf for brands to consider and, if this assumption is granted, there are several well-established results that suggest some likely effects of product familiarity on brand name recognition.

As might be expected, previous exposures to a word increase the ease with which it is recognized. This phenomenon has been labeled *perceptual enhancement* (Jacoby 1983a). The issues of principal interest for consumer research are (1) the number of exposures needed for enhancement, and (2) the types of exposures that maximize enhancement.

Many brand names begin as nonsense (e.g., Exxon, Triscuit, Tylenol, etc.) or borrow from existing words that have no relation to brand meaning (e.g., Apple computers, Poulan chain saws, Tide detergent, etc.). Initially, consumers have no knowledge about such brands and may not even know how to pronounce the brand name. Word recognition studies have shown that pseudowords (i.e., pronounceable nonwords) are initially more difficult to identify than real words (Feustel, Shiffrin, and Salasoo 1983); however, after several exposures (approximately five), the differences between words and pseudowords disappear (Salasoo, Shiffrin, and Feustel 1985a). More importantly, even a year after exposure, pseudowords show no recognition deficits relative to real words. Salasoo et al. concluded that a permanent memory "code" for such nonwords results from the first few exposures. The exact nature of this code is still a matter of considerable debate (Jacoby 1983a, 1983b; Jacoby and Brooks 1984; Johnston, Van Santen, and Hale 1985; McClelland and Rumelhart 1981, 1985; Morton 1969, 1979; Salasoo et al. 1985a, 1985b; Tulving 1983, 1984, 1985). However, most researchers would agree that this code plays a crucial role in connecting perceived words with their meanings. Therefore, the establishment of the code is a fundamental first step in acquiring brand knowledge.

Less is known about the process of attaching new meanings to old words. However, most of the observed perceptual enhancement effects occur only for words that share a common meaning. For example, exposure to the word "bored" enhances the perception of the word "boring," but not the word "born" (Murrell and Morton 1974). Therefore, it is natural to assume that a new memory code must be established whenever an existing (unrelated) word is used as a brand name. It is not known whether this is easier or more difficult than establishing the code for a pseudoword. Similarly, little

[7]We have adopted this approach because (1) visual recognition processes are covered to some degree in our discussions of automaticity and concept formation in the Appendix and in our discussion in this section of brand name recognition, and (2) empirical investigations of recall have been dominated by verbal stimuli (perhaps because investigations of recall for visual stimuli are greatly complicated by the lack of viable nonverbal response measures).

[8]Note that word recognition paradigms differ from the typical recognition tasks used in most verbal learning experiments (e.g., Crowder 1976; Mandler 1981). The latter require subjects to retrieve information that will determine whether the word in question occurred in a particular context (e.g., a previously studied list; see Mandler 1981, Jacoby 1983a, Jacoby and Brooks 1984, and Tulving 1983, 1984, 1985 for discussions of the similarities and differences between these tasks). It seems that identifying the exposure context is seldom important for brand name recognition. This does not mean that contextual information does not affect word recognition (see Jacoby 1983a, 1983b and our subsequent discussion) or that retrieving contextual information is not important for other types of consumer memory (see our earlier discussion of memory for the source of embellishments).

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is known about the use of semantically related words as brand names (e.g., Realemon lemon juice, Digital computers, Pizza Hut restaurants, etc.). We suspect that previous meanings interfere with the establishment of unique memory codes; however, research is needed to make clear predictions.

In addition to the permanent effects of the first few exposures to a word, there are at least two types of previous exposures that have significant, but less persistent, effects on word recognition. First, exposure to a particular word "primes" other words that are semantically or episodically associated with it, facilitating their recognition for a very brief period of time (i.e., a few seconds; Anderson 1983a; Heyer, Goring, and Dannenbring 1985; Meyer and Schvaneveldt 1971; McKoon and Ratcliff 1986). Such priming from recent in-store exposures seems unlikely. However, the broad generality of the priming stimuli (i.e., any associated words) suggests that brand recognition is facilitated whenever consumers are thinking of semantically related words, such as the product class name. As we have discussed earlier, the ways in which consumers categorize brands, and therefore the brands that are primed during search, change as product familiarity increases.

The second type of transitory effect concerns facilitation in word recognition due to previous exposures to the same word. Words that occur frequently in the language are more easily identified than infrequent words. Moreover, a single exposure to a word produces a facilitatory effect that lasts for at least a week (Jacoby 1983a; Tulving, Schacter, and Stark 1982), but not as long as a year (Salasoo et al. 1985a). Some authors have hypothesized that there are enduring memory codes whose thresholds are gradually lowered as they are more frequently encountered (e.g., Morton 1969, 1979). Other authors have emphasized the role of particular exposure episodes (e.g., Feustel et al. 1983; Jacoby 1983a; Jacoby and Brooks 1984). They point out that a single recent exposure often overrides the differences between words that presumably have accrued over a lifetime.

The implication of the latter finding is that product familiarity, in the sense of total number of product-related experiences, may not have much effect on brand name recognition. Rather, the most recent experiences will be most influential. The same authors have also emphasized the episodic nature of perceptual enhancement, arguing that the match between the types of information encoded during previous exposures and the information present during recognition is critical (not unlike the encoding specificity principle proposed in Tulving 1983, 1984, 1985; Tulving and Thomson 1973). Therefore, it is important to consider the extent to which perceptual enhancement generalizes to different recognition environments or, conversely, which types of product-related experiences enhance in-store brand name recognition.

As mentioned earlier, perceptual enhancement does not generalize to words that have different meanings but similar visual appearances (Murrell and Morton 1974; Witherspoon and Allan 1985). Moreover, enhancement does generalize to words that have the same meaning but different visual appearances (Jacoby and Brooks 1984; Morton 1979; Murrell and Morton 1974). However, this generalization is substantially reduced if the word is novel (e.g., pseudowords) or is visually observed but not specifically named (Jacoby and Brooks 1984). Finally, there is no generalization to printed words from pictures, spoken words, or self-generated words (Jacoby 1983b; Morton 1979).

These generalization results imply that the effects of exposure to brand names may differ significantly for advertising exposures and product usage exposures. Because the brand name is usually presented identically on packaging and/or on the product itself, exposures to the name during product usage should generally enhance in-store recognition. Exposures to product appearance (but not brand name) during usage are not likely to enhance brand recognition unless product appearance is a salient part of packaging. Advertising, on the other hand, often presents the brand name in a variety of ways. For instance, in television commercials the product (but not the brand name) may be visually presented and the name spoken. These sorts of experiences are not likely to enhance (visual) brand name recognition. Finally, if one reads about a brand as part of advertising copy or publicity, enhancement should result even though the visual appearance of the brand name differs in the two contexts. If advertising copy is "skimmed," but not read, the effect of exposure to the brand name may be reduced.

In summary, we have identified three ways in which product familiarity may enhance brand name recognition (thereby increasing the likelihood of brand consideration). First, a small number of exposures to a new brand name are required to establish a permanent memory code. Presumably, this code mediates subsequent brand knowledge by connecting the name to the developing brand meaning. Second, structural aspects of consumer knowledge determine which brand names are (briefly) perceptually enhanced via associative priming in various situations. As discussed earlier, cognitive structure changes systematically with product familiarity. Third, frequent or recent exposures to the (printed) brand name enhance recognition. The effects of a single exposure may last for several days.[9]

[9]All of these effects depend critically on the assumption that the perceptual enhancement that has been observed in the laboratory is sufficiently large to affect brand name recognition in a realistic setting. Even if this assumption proves false, however, there is reason to believe that perceptual enhancement may affect consumer behavior in at least two other ways. First, several recent studies have provided evidence that "relative perceptual fluency" (i.e., ease of word recog-

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Brand Name Recall. In many consumer situations, the recall of brand names is cued by either product class or specific attribute information (Nedungadi 1986). In essence, the consumer's task is to produce instances of either taxonomic (e.g., beer) or goal-derived (e.g., something cold to drink) categories, respectively. There is considerable evidence that graded structure affects both types of recall. Specifically, prototypical brands are recalled more frequently and more rapidly than atypical brands (Nedungadi and Hutchinson 1985; Ward and Loken 1986; also see Barsalou 1985a, 1985b; Kelley, Bock, and Keil 1986; Rosch and Mervis 1975; and Smith, Shoben, and Rips 1974).

As discussed earlier, the graded structure of categories is jointly determined by frequency of instantiation, family resemblance, and preference (Barsalou 1985a; Nedungadi and Hutchinson 1985). Little is known about how these determinants interact with expertise. It seems reasonable to expect, however, that the impact of frequency of instantiation decreases with expertise because, unlike family resemblance and preference, it is not directly related to product attributes and benefits, and it may be affected by irrelevant factors such as frequency of advertising exposure. If expert recall is guided by analytic processes, then frequency of instantiation should be a lesser determinant for experts relative to novices. Interestingly, Hutchinson (1983) found that advertising expenditures were highly correlated with brand name recall for novices but not for experts.

Also, Barsalou (1983, 1985a) found that goal-derived categories are much less well established in memory than are common taxonomic categories. In particular, prototypicality ratings are less predictive of recall frequency (Barsalou 1985a), and automatic detection processes are less developed (Barsalou and Ross 1986). Thus, prototypicality is not expected to predict inclusion in the evoked set as well for goal-derived categories as it would for common product categories. Similarly, because effortful processing is generally required, consumers should be less aware of products *as members of goal-derived categories.* The apparent reason for this difference is that goal-derived categories are used infrequently relative to taxonomic categories. There is evidence that repeated use of these categories can make them functionally equivalent to common categories in terms of memory processes (Barsalou and Ross 1986). Thus, after years of dieting, "things not to eat on a diet" would have information processing characteristics that are similar to "automobiles." Presumably, the structural differences between goal-derived and taxonomic categories remain unchanged.

Given the preceding discussion, it is natural to expect that the size of the memory effects associated with goal-derived categories increases with product familiarity. Consider, for example, the difference between a novice backpacker and an experienced one. Without strong memory effects, we would expect the evoked set of the novice for "things to buy for a packpacking trip" to be heavily influenced by external factors such as the inventory and shelf display of products in the stores in which s/he shops. The evoked set of the experienced backpacker is likely to be more memory-based.

Another aspect of brand name recall that may affect consumer decision making involves the extent to which different brands are recalled together. Brands that are frequently recalled together are likely to be included in the same evoked sets and, therefore, compete more directly with each other than brands that are seldom recalled together. Moreover, the composition of the set of considered brands can "bias" choice in several ways (e.g., agenda effects—Tversky and Sattath 1979; decoy effects—Huber, Payne, and Puto 1982; and similarity effects—Tversky 1972; Tversky and Sattath 1979).

Brand names tend to be recalled in categorical clusters (Hutchinson 1983; also see Bousefield and Sedgewick 1944; Friendly 1979; Gruenewald and Lockhead 1980). This covariation may arise because the category name functions as a retrieval cue or simply because brands in the same category are highly associated with each other. In either case, the consumer's category structure should have a strong influence on brand name clustering during recall. As was discussed earlier, the expert's category structure differs significantly from the novice's.

The significance of this phenomenon is illustrated in the Figure. This brand recall protocol was produced by a single subject in response to instructions to list the brand names of any products that can be used to treat the symptoms of the common cold (from Hutchinson 1983). Brand name clustering is clearly related to benefit categories (based on product class tables given in the *Handbook of Nonprescription Drugs* 1979). For instance, Alka-Seltzer Plus, Congespirin, NyQuil, and Comtrex are all multi-ingredient drugs that contain a decongestant and an analgesic, and can be used to treat head colds. NyQuil and Comtrex also contain a cough suppressant and, in principle, could have been clustered with cough remedies such as Robitussin or Vicks Formula 44. It is of interest to note that Vicks Formula 44-D was clustered with cough remedies even though it contains a decongestant and is functionally similar to NyQuil and Comtrex. This is probably the result of successful positioning on the part of Vicks, inasmuch

nition) is subjectively detectable and may be attributed to familiarity by the perceiver or experienced as a feeling of familiarity (even when fluency has been caused by stimulus properties; Witherspoon and Allan 1985; also see Johnston, Dark, and Jacoby 1985). This type of brand familiarity is likely to have a positive effect on brand attitudes (Obermiller 1985; Zajonc and Markus 1982). Second, consumers with high levels of product familiarity are likely to have read all product-related words more frequently and recently than consumers with low levels of familiarity. The aggregate effect of perceptual enhancement on the entire product vocabulary should make reading product information easier and more rapid, thereby facilitating further learning.

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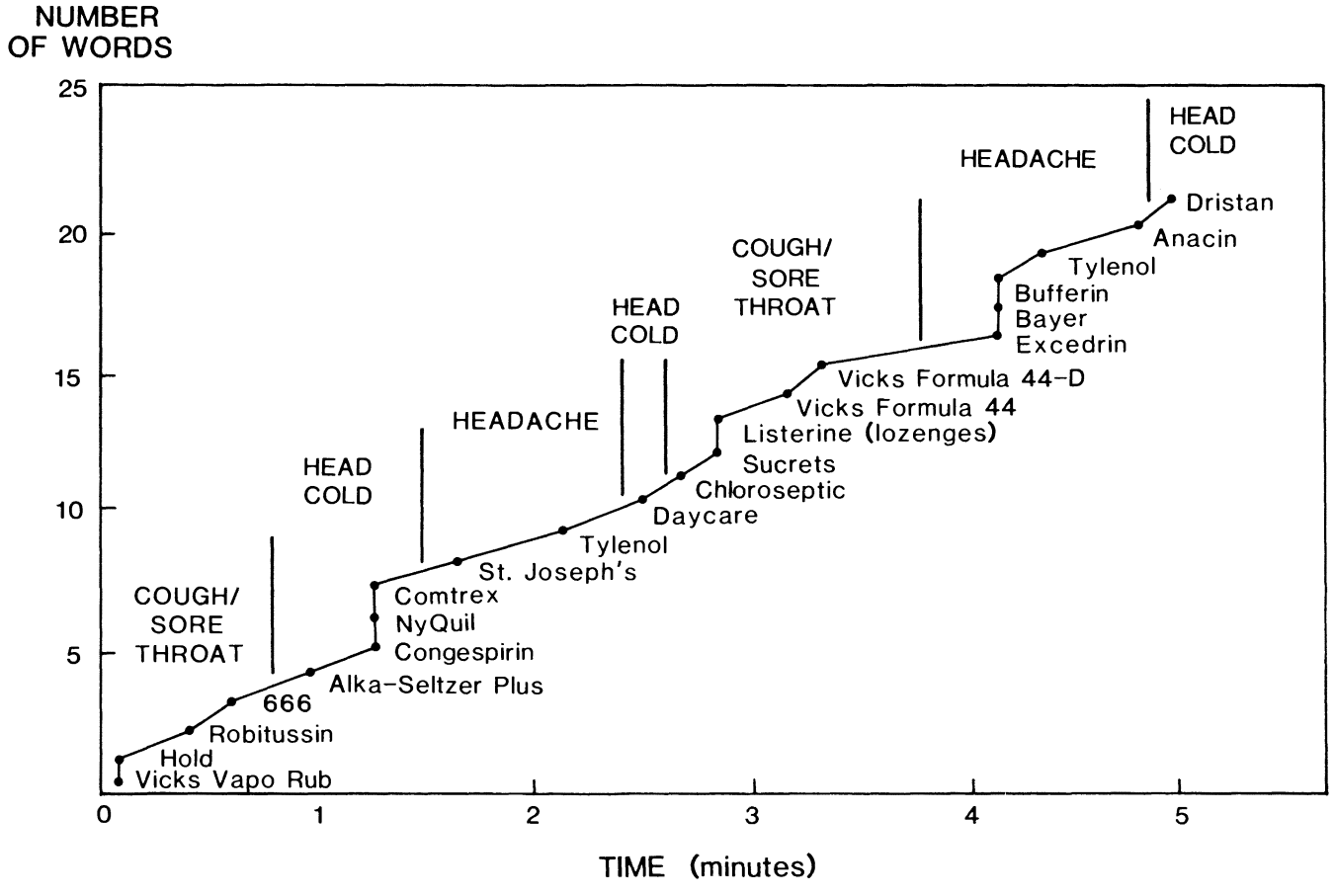
FIGURE

A FREE RECALL PROTOCOL FOR A SINGLE SUBJECT (BRAND NAMES OF COLD TREATMENT PRODUCTS)



as they also make NyQuil and need to avoid cannibalization.

Hutchinson also found that brand name clustering was more related to ingredients for pharmacy students than for marketing students. Thus, a knowledgeable consumer might categorize Formula 44-D as a head cold treatment, or perhaps form a third, "cough-cold," category that includes Comtrex, NyQuil, and Formula 44-D, but not the others. Furthermore, such a consumer is likely to choose Formula 44-D over the other two because it generally costs significantly less. On the other hand, a novice consumer might consider only Comtrex and NyQuil. This constitutes an agenda effect similar to the ones discussed by Tversky and Sattath (1979).

In conjunction with our earlier discussions of cognitive structure and analysis, this example suggests at least two hypotheses regarding clustering in brand name recall. First, categorical clustering is likely to be more specific for experts than for novices (e.g., cough-cold products). Second, the attributes that are associated with clustered brands are likely to be more causally important and relevant for experts than for novices (e.g., ingredients).

Memory for Complex Information

As noted in our discussion of selective encoding, expertise is likely to affect the extent to which consumers search for and process product-related information through its effects on comprehension and cognitive effort. Naturally, differential exposure should affect recall. In this section we wish to emphasize that expertise and recall are strongly related independently of exposure effects (see Alba and Hasher 1983). This relationship is a robust one, having been observed across a variety of knowledge domains and measures (cf. Alba 1983; Ausubel and Fitzgerald 1962; Chiesi, Spilich, and Voss 1979; Voss et al. 1980).

The implication is that when decisions are memory-based, knowledge may afford the expert an opportunity to use processing and decision strategies that are very different from the ones the novice may use. When expert and novice consumers learn the same information and

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later must make a decision, the expert may be able to rely on memory, whereas the novice may again need to engage in the external search or else make an ill-informed decision. In this case, the advantage to the expert lies in the sheer quantity of information that can be recalled.

However, in addition to this main effect, expertise and recall are likely to interact in other ways that are important to decision making. One general type of interaction involves the nature of the stimulus information and is driven by the expert's ability to notice relative differences in the importance, relevance, and consistency of facts contained in a message (Brewer and Nakamura 1984; Hastie 1981; Taylor and Crocker 1981).

Importance Effects. First, consider the importance and relevance of particular facts. A substantial body of evidence suggests that recall of a message is significantly affected by the perceived importance and relevance of the facts contained therein. Facts that are relevant to the theme of a message (Johnson 1970; Kintsch and van Dijk 1978), the attainment of a goal (Brewer and Dupree 1983; Lichtenstein and Brewer 1980; Owens et al. 1979; Voss et al. 1980), or an impending judgment (Kozminsky et al. 1981; Lingle et al. 1979) are recalled better than facts of lesser importance and relevance. However, such effects can be person-specific, inasmuch as relevance and importance may depend on one's point of view (Anderson, Spiro, and Anderson 1978; Lingle et al. 1979; Pichert and Anderson 1977; Zadny and Gerard 1974).

In the context of consumer decision making, perceived importance is likely to vary as a function of, among other things, consumer expertise (cf. Jacoby et al. 1986; Wind and DeVita 1976). Due to their superior ability to distinguish between relevant and unimportant product information, experts should recall a greater amount of important and decision-relevant information; that is, the expert enjoys an advantage in terms of the quality of information recalled. As a result, when decisions are memory-based, experts maintain their superior ability to be analytic. Moreover, this advantage may grow over time. Initially, all consumers may retain a reasonably large amount of information. However, as memory fades, the effects of knowledge on recall may increase (see below). Thus, the carry-over effects of advertising (Hutchinson and Moore 1984; Sawyer and Ward 1979) are likely to be moderated by consumer knowledge.

Schema Consistency. A second aspect of the stimulus that may interact with knowledge is its consistency. Among those facts that are important, *schema-inconsistent* facts often are recalled better than *schema-consistent* facts, and both are recalled better than *schema-irrelevant* facts (Hastie and Kumar 1979; Srull 1981; Srull, Lichtenstein, and Rothbart 1985). Thus, if features of a product violate the consumer's expectations for the product or its class, those features should be recalled quite well. This should be particularly true for experts because they are most sensitive to incongruence (cf. Fiske et al. 1983; Sujan 1985).

However, a contrast effect occurs when consistency is assessed relative to a decision rather than a schema; that is, there is a tendency to recall decision-consistent over decision-inconsistent facts. This effect occurs whether the facts reside in semantic memory (Koriat, Lichtenstein, and Fischhoff 1980) or are part of a recently encoded message (Dellarosa and Bourne 1984). Such recall biases are analogous to findings of preferential recall of chosen-brand information (Biehal and Chakravarti 1983; Johnson and Russo 1981), though the latter results probably stem from the differential attention paid to chosen and rejected brands. Regardless, as Koriat et al. suggest, recall biases may be partly responsible for the overconfidence people often exhibit when evaluating the correctness of a decision.[10]

Memory Measures. In addition to these stimulus interactions, the effects of knowledge on memory also interact with the type of memory test that is used. The many studies reporting inferior memory for incomprehensible and unimportant information have almost uniformly used unaided recall as the dependent measure. When cued recall (Anderson and Pichert 1978; Koriat et al. 1980; Owens et al. 1979) or recognition tests (Alba et al. 1981; Brewer and Dupree 1983; Chiesi et al. 1979; Dellarosa and Bourne 1984; Thorndyke and Yekovich 1980) are employed, however, memory differences either disappear or are greatly attenuated. Failure to comprehend a message does not inhibit its storage, nor does processing it with particular biases about what is and what is not important. Thus, in situations in which recall is not important, as when a package or point-of-purchase display reminds consumers of previously advertised information, the memory advantages enjoyed by experts may diminish somewhat

[10]It should be noted that the precise role that memory plays in decision making has been questioned. Recent research shows that recall of specific information may, at times, be unrelated to judgment (cf. Anderson and Hubert 1963; Carlston 1980; Kardes 1986; Lichtenstein and Srull 1985; Lingle and Ostrom 1979; Sherman et al. 1983; Wyer, Srull, and Gordon 1984). In such cases, it appears that people engage in "judgment-referral" (Alba and Ofir 1985) or affect-referral (Wright 1975a), thereby relying on previously generated judgments and feelings rather than their memory for specific attribute information. In other circumstances, however, recall of information or internal responses to that information does play a significant role in decision making (Bargh and Thein 1985; Biehal and Chakravarti 1983; Calder, Insko, and Yandell 1974; Hoch 1984b; Lichtenstein and Srull 1985; Loken and Hoverstad 1985; Reyes, Thompson, and Bower 1980; Srull 1986). This appears to be especially true when no judgment was made at the time of encoding, new alternatives become available, or new information is obtained and must be evaluated in light of previously acquired knowledge.

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(see Bettman 1979 and Singh and Rothschild 1983 for discussions of the relative situational importance of recall and recognition). Nonetheless, the ability to recognize a previously encountered message may be of limited usefulness if the meaning, importance, or implications of its assertions are not fully understood.

Explanations and Implications

In the preceding section, we described several empirical relationships that exist between knowledge and recall of complex information. Left unspecified, however, were the mechanisms that account for them. In this section we will attempt to show that the ability to recall product-related information is a natural by-product of both familiarity and the other dimensions of expertise. That is, recall covaries with practice, the development of cognitive structure, and the consumer's analytic and elaborative skills.

Repeated Exposure and Recency. It is well known that repetition enhances retrieval (Crowder 1976; Hintzman 1976; Sawyer and Ward 1979). And because experts receive greater exposure to particular brands and attributes, their memory for that information is better. However, for some brands and attributes, both novices and experts may reach an asymptotic level of familiarity. At such high levels of familiarity, retrieval may be relatively effortless, even if one's overall level of expertise is quite low. When two ideas are closely associated through mere repetition, one may elicit the other directly and spontaneously. For example, presentation of the name "Rolls Royce" may cause a consumer to generate thoughts about luxury or wealth. Indeed, a popular goal of advertising is the creation of an association between a brand and its image, position, or major attribute (Reeves 1961).

Long-term repetitive advertising also insures that the consumer is constantly reminded about the brand and that the temporal distance between exposure and purchase is short. Due to the effects of recency on recall, such advertising may also diminish expert/novice differences that otherwise would occur (cf. Morrison 1984).

As two of several determinants of recall, repetition and recency are likely to be very influential in the decision process, particularly for novices. Because novices may engage in less search, lack the expertise to use other retrieval cues (see later), and are less equipped to make product comparisons, they are more likely to be influenced by top-of-mind brand and attribute awareness or by cues available at the point of purchase. Parenthetically, this suggests that problem framing techniques may be effective not only in influencing the perceived importance of information for novices, but also in selectively reminding them of features on which the advertised brand fares well. Experts, on the other hand, are more likely to recall brand information spontaneously and are less likely to choose a brand on the basis of its advertising-induced salience or evaluate a brand solely on the basis of its major selling proposition.

Finally, it should be noted that the effects of exposure extend beyond recall in at least two ways. First, through its effect on simple recognition, prior exposure may facilitate subsequent processing of complex information by allowing the consumer to direct cognitive effort to elaboration and away from encoding (Alba 1983). Second, through its effect on perceived familiarity, previous exposure to product-related assertions may increase their perceived validity (cf. Bacon 1979; Begg, Armour, and Kerr 1985; Hasher, Goldstein, and Toppino 1977). It may be assumed that all consumers are affected by this phenomenon but that novices are affected to a greater degree because they are less aware of the true validity of a greater number of assertions.

Cognitive Structure and Analysis. Recall is also affected by the number of facts a consumer has accumulated, knowledge of the importance and typicality of those facts, and an understanding of how those facts are interrelated.

Consider first the advantages of possessing a schema to guide encoding and retrieval. For example, assume that an expert possesses and a novice lacks a well-developed schema for a computer. When processing a description of a new computer, the expert is able to recognize the attributes being described and identify them according to their importance and typicality. This affords the expert several advantages.

During encoding the analytic ability of experts may cause them to process important information more selectively and intensively than other information, resulting in a corresponding pattern of recall. Moreover, an expert also should be more familiar with the attributes of the product. Consequently, when processing the description s/he needs only to associate the features with the brand; the novice, on the other hand, must learn the attributes *and* associate them with the brand. Thus, the novice should experience a higher information load (Johnson and Kieras 1983).

During retrieval, recall of the computer's attributes may be guided by the preexisting schema. A person who possesses a schema can use its features to access corresponding information contained in the new information (cf. Brewer and Dupree 1983; Egan and Schwartz 1979; Lichtenstein and Brewer 1980). The schema may be viewed as a multifaceted retrieval cue (Anderson et al. 1978; Barsalou, Usher, and Sewell 1985; Bellezza and Bower 1982; Brewer and Treyens 1981). As such, it should have a large facilitating effect on recall but a relatively small effect on recognition.

This is not to say that only schema-related information can be recalled. Some schema theories also make provisions for the recall of atypical features. Specifically, items that do not match the schema are presumed to receive special tags, making them particularly memorable (Graesser et al. 1979). However, one im-

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plication of such theories concerns changes in recall as a function of time. As time passes, episodic facts should fade, memory should become increasingly schema-driven (Bartlett 1932; Dooling and Christiaansen 1977), and the probability of recalling atypical features should decrease (Arkes and Harkness 1980; Bower et al. 1979; Graesser et al. 1980; Hunt, Bonfield, and Kernan 1986; Schmidt and Sherman 1984; Smith and Graesser 1981).

Consider next the relations that exist among product attributes. Just as category structure affects the quantity and quality of brand recall, the manner in which complex information is organized in memory should affect the way it is recalled (see Klein and Kihlstrom 1986).

We present two examples of organization. First, attributes may be organized in terms of the brands that possess them. Research suggests that familiarity mediates a consumer's ability to organize attribute information in this way (Srull 1983; also see Pryor and Ostrom 1981).

Second, attributes themselves may be organized categorically in terms of their semantic, functional, and decision-related implications (cf. Dellarosa and Bourne 1984; Hamilton, Katz, and Leirer 1980; Means and Voss 1985). And although some attributes may be familiar to all consumers, the degree to which consumers understand how the attributes load on higher-order dimensions may differ. For example, the attributes leg room, bucket seats, and air conditioning all function to provide the more abstract benefit of comfort. Here, knowledge allows one to understand how a particular attribute is related to its functional category. When a list of message-conveyed attributes has an inherent categorical structure, experts are able to perceive it; when the list lacks an organized structure, experts are able to impose one.

Given these structural and processing characteristics, the previously discussed empirical relationships may be explained further. First, comprehension differences should arise across segments because experts are able to perceive how different attributes relate to one another, whereas novices perceive, at the extreme, a list of unrelated facts. These comprehension differences occur regardless of the familiarity of the individual attributes. A message that describes a product in terms of unfamiliar attributes is incomprehensible in the basic sense. When the attributes are understood but the relations are not, the message appears unorganized but the isolated facts may still have some meaning. For example, if a consumer does not have the necessary concepts to understand the phrase "32-bit memory," the message will seem incomprehensible. If the consumer knows what "bits" and "memory" are with respect to computers but does not fully understand the implications of 32-bit memory for computing power, s/he will not be able to organize that fact with other facts that load on the computing power dimension and will not be able to use "power" as a retrieval cue.

Second, these comprehension differences may lead to differences in information load. Whereas expertise leads to relatively effortless organizing of the stimuli, consumers who lack expertise may struggle to understand how one attribute is related to another. Moreover, by "chunking" related pieces of information, the effective capacity of working memory can be expanded (cf., Chase and Ericsson 1982).

Finally, because a major processing difference between experts and novices appears to be in their ability to organize information, one would expect recall but not recognition differences on a memory test (cf. Dellarosa and Bourne 1984). Information that is organized by category is easier to recall because each category name is an effective recall cue (Tulving and Pearlstone 1966). Srull (1983) has illustrated this effect nicely with brand/attribute information. When he presented information in an organized or "blocked" fashion, recall differences between high and low knowledge subjects were relatively small. When presented in a "random" fashion, however, large differences emerged between the groups. Because organization typically plays a lesser role in recognition than in recall, differences in recognition as a function of knowledge should again be small (see Srull 1981).

Elaboration. In the previous section we described how different concepts can be organized via association to a common higher-order concept. The final major explanation of knowledge-based recall effects involves elaboration and the direct associations it creates among facts during encoding.

One class of associations consists of the coherence relations described previously in the context of interpretive inference. These inferred associations, which lend referential and causal coherence to the message, aid both comprehension and recall (Black and Bern 1981; Cirilo 1981; Haviland and Clark 1974; Just and Carpenter 1978; Lesgold, Roth, and Curtis 1979; Mandler and Johnson 1977). The effects are likely to be greatest for complex and technical products (cf. Vipond 1980)—cases in which expert/novice differences are amplified. Coherence aids comprehension by allowing the consumer to understand how one assertion is related to another. It aids recall because the associations that are formed provide retrieval cues. If two assertions are linked, one may cue the other. In addition, increased coherence often is characterized by a decrease in the amount of time required to process the information.[11] When the relationship between two ideas cannot be quickly established, additional resource-consuming processes such as memory search and inference making

[11]This point is often ignored by advertising practitioners. Equations used to predict advertisement reading time often include variables such as number of words per sentence, size of the words, and so on (Abruzzini 1967; Percy 1982). Rarely do they take into account coherence relations (but see Thorson and Snyder 1984). The psycholinguistic literature shows that coherence accounts for a significant amount of the reading time variance.

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must be initiated, thereby increasing cognitive load (cf. Haberlandt and Graesser 1985). Moreover, expert/novice differences in recall and comprehension are further amplified when the time available for these extra search and inference processes is limited, as it is with broadcast media (cf. Chaiken and Eagly 1976). Finally, because the recall differences between experts and novices are explained through associative cuing, recognition should not be affected to as large an extent (Alba et al. 1981).

The other relevant class of associations more closely resembles embellishment. Because experts possess a richer knowledge base and have a larger amount of available cognitive capacity, they are more likely to elaborate on product-related information and thereby connect the new facts to previously learned facts (perhaps resulting in a more polarized attitude; Tesser and Leone 1977). Such elaboration may create retrieval paths to the new information that facilitate its recall (Bradshaw and Anderson 1982; Craik 1979; Kisielius and Sternthal 1984).[12]

Elaboration of this sort also helps to explain the relationship between expertise and the recall of inconsistent information. In addition to their ability to understand how concepts and assertions are related to each other and to notice atypicality, experts also have a superior ability to detect inconsistencies among facts (Fiske et al. 1983). The enhanced recall of inconsistent information may be explained in terms of the greater processing devoted to it. If an attribute is incongruent with other facts or with one's expectations, an attempt may be made to resolve the inconsistency. This results in greater rehearsal of that attribute, greater encoding effort, additional inferences, greater interconnectedness with other attributes, and therefore enhanced recall (Brewer, Dull, and Lui 1981; Hastie 1984; Srull et al. 1985; but see O'Sullivan and Durso 1984). In a decision context, however, facts that do not support the final decision need not be inconsistent with each other or with the decision maker's schema. Thus, they may not receive greater elaboration and, because they will be less directly linked to the final decision, facts inconsistent with a decision may be recalled less well than consistent facts. Regardless, because recall is explained in terms of associative cuing, much smaller effects should be expected when the dependent measure involves recognition (Srull et al. 1985).

This explanation of the consistency effect has some interesting implications. The first concerns the time frame. Although the effect has been shown to be durable over short periods of time, over very long periods it may start to resemble the typicality effect. That is, as recall becomes more schema-driven, memory for inconsistent facts may become very poor (cf. Hastie and Kumar 1979; Wyer and Srull 1980).

The second implication is that inconsistency should affect recall only when attempts are made to resolve it. When inconsistent information is presented and subjects are prevented from elaborating, the effect disappears (Srull 1981; Srull et al. 1985).

Both implications may partially account for the relatively low impact of corrective advertisements (cf. Armstrong, Gurol, and Russ 1983; Mazis, McNeill, and Bernhardt 1983). A corrective ad contains information that is inconsistent with previously stated information about a product. Thus, if information about a product is recalled long after the corrective ad has been run, the association between the corrective facts and general knowledge may become difficult to retrieve (cf. Sawyer 1976). And if the consumer is not highly involved when processing the corrective ad, the associations may not be formed at all.

Interference. In addition to enhancing memory for particular facts in the ways described above, expertise also may reduce the extent to which recall of those facts is inhibited by competing information. A robust finding in memory research is that as the number of items an individual learns increases, the proportion of those items that can be recalled decreases (e.g., Roberts 1972). In the present context this implies that as more brands are learned or more facts are learned about a particular brand, the more difficult it becomes to recall any one of them. It also has been demonstrated that once a set of brands or attributes has been learned, presentation of a subset of them sometimes inhibits recall of the remainder, with the amount of inhibition increasing with the size of the presented subset (Alba and Chattopadhyay 1985a, 1985b). Thus, advertisers may inhibit recall of some competing brands or may frame decisions through the inhibition of particular attributes by mentioning other nonthreatening brands or attributes in their ads.

Several theories have been advanced to account for these effects (Anderson 1983a; Nickerson 1984; Raaijmakers and Shiffrin 1981; Roediger and Neely 1982). However, discussion of them is beyond the scope of this paper. Instead, we would like to note the relationship between interference and knowledge. That is, interference effects appear to be strongest early in the learning process. As familiarity with the stimuli increases, and as knowledge of them becomes better organized and more differentiated, interference decreases (Alba and Chattopadhyay 1985a; Anderson 1983a; Hayes-Roth 1977; Pirolli and Anderson 1985; Srull and Brand 1983).

[12]In this case experts outperform novices because they are able to generate more retrieval cues. It should be noted that in other cases an opposite and paradoxical effect may obtain. That is, when a novice needs to engage in additional elaboration or reasoning in order to comprehend the same information that an expert comprehends easily, the novice may actually recall it better (cf. O'Brien and Myers 1985). This effect is analogous to our previous suggestion that novices may be more accurate than experts in identifying the source of an inference.

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EXHIBIT 5

MEMORY: SPECIFIC RESEARCH HYPOTHESES

Summary of hypotheses

Memory for simple information

5.1 Relatively few exposures to a new brand name produce a highly persistent facilitative effect on brand name recognition.

5.2 Structural aspects of consumer knowledge (i.e., product-related associations) determine which brand names are perceptually enhanced via associative priming.

5.3 Frequent or recent exposures to the brand name enhance recognition (for at least several days); however, such effects are modality-specific.

5.4 The impact of frequency of instantiation on brand name recall decreases with expertise.

5.5 Ad hoc categories become more like taxonomic categories as product familiarity increases, reducing consumer dependence on stimulus-based information.

5.6 Consumer knowledge about product categories and attributes influences which brands are frequently recalled together, thereby affecting the composition of memory-based evoked sets.

5.7 Categorical clustering in brand recall is more specific for experts than for novices, reflecting a more differentiated knowledge structure.

5.8 Brand name recall by experts is more influenced by causally important categories and attributes than is recall by novices.

Memory for complex information

5.9 Holding amount of exposure constant, expertise results in better recall of product information, thereby increasing the quantity of information that can be used in memory-based decision making.

5.10 Relevant information is recalled better than irrelevant information; therefore, the superior ability of experts to identify relevant information results in qualitative differences in the information used by experts and novices during memory-based decision making.

5.11 The qualitative differences in recall between experts and novices that are due to information relevance increase over time.

5.12 Under some conditions, schema-inconsistent information is recalled better than other information, and prior knowledge determines the schema-consistency of any given fact; however, decision-consistent information is recalled better than decision-inconsistent information.

5.13 Memory differences between experts and novices are greater for recall than for recognition; therefore, the memory effects of expertise on decision making are greatest whenever the decision environment provides few external retrieval cues.

Explanations and implications

5.14 Repeated or recent exposure to the same information can compensate for deficits in expertise, resulting in equivalent recall for experts and novices.

5.15 During memory-based decision making, novices are influenced more than experts by frequently repeated or recently presented information due to their relative inability to encode information initially and generate retrieval cues internally during recall.

5.16 Schematic knowledge provides an internal source of retrieval cues during recall.

5.17 Experts are better able than novices to organize complex information during both encoding and retrieval, which provides them with a recall advantage.

5.18 The associations among facts that result from elaboration during inference-making are an internal source of retrieval cues; experts are better equipped to elaborate on product information, and thus possess a greater number of such cues.

5.19 Prior knowledge (schematic, categorical, or factual) reduces information load during encoding, providing an opportunity for higher levels of learning (of either the same or additional information).

5.20 The simple accumulation of product-related facts inhibits the recall of any particular fact; however, the previously identified advantages of expertise can compensate for this disadvantage of experience.

Specific Research Hypotheses

Research hypotheses regarding memory are presented in Exhibit 5. Clearly, experience and expertise can have wide-ranging effects on a consumer's ability to remember product-related information. Different types and amounts of memory facilitation obtain from simple exposure, repeated exposure, varied experience, differences in cognitive structure, and analysis.

At the most "primitive" level, mere exposure to a brand name may result in perceptual enhancement of it during visual search. Repeated or recent exposure to a single brand or attribute may lead to easy retrieval of it in situations requiring unaided recall. Such effects require little expertise. Wider experience results in the accumulation of more information, which enables consumers to include more brands in their memory-based evoked sets and to recall and use more attributes during memory-based decision making. However, wider experience is also often accompanied by increased expertise. As knowledge becomes differentiated and the relations between and among brands and attributes are

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learned, recall is improved independently of exposure. As expertise develops further, brands become differentiated more specifically and on the basis of more meaningful criteria, and attributes take on task-relevant importance values. Consequently, the quality of the information recalled by experts and novices also differs. Thus, given that unaided recall is rarely perfect, memory-based evoked sets should include a more optimal group of brands, and memory-based decisions should become more analytic as expertise increases.

CONCLUSION

In the preceding sections we described five fundamental dimensions of consumer expertise. In addition, we described many differences that exist between experts and novices on each one. In the process, an attempt was made to demonstrate how differences in expertise are reflected in the most fundamental consumer behavior, namely, decision making.

Methodological Implications

It was argued at the outset that product familiarity, defined in terms of sheer number of product-related experiences, cannot capture the complexity of consumer knowledge. Throughout this paper we have tried to support this basic proposition. In the process, we have also argued that different types of experiences lead to the development of different dimensions of consumer expertise and, moreover, that the relative importance of each dimension is task-specific. To the extent that these assertions are valid, they carry significant methodological and theoretical implications.

Because interactions exist among the dimensions of expertise, any measure of consumer knowledge is, in a weak sense, a measure of every dimension. However, most measures tap one skill more accurately than others. And because consumer skills are often task-specific, valid predictions concerning the effects of consumer knowledge on behavior may receive weak empirical support if the knowledge measures used are insensitive to the dimensions of expertise most relevant to the experimental task.

In some cases, failure to consider and accurately measure expertise in ways that are task-relevant may lead to experimental findings that are directly opposite to the ones predicted. For example, frequent purchase and use of a product may themselves indicate high knowledge, or they may lead subjects to produce high ratings of subjective familiarity or knowledge. When these ratings result from frequent purchase and use of a single brand, they should accurately predict recall and perceptual identification of that brand. However, habitual behavior, because it does not include interbrand comparison or deliberate information search, may result in little differentiation of the product class or improvement in analytic ability. Conversely, a consumer whose purchase and usage rate is much lower but whose behavior is less habitual may exhibit considerable expertise along these latter dimensions. Therefore, if the experimental task requires differentiation or analysis, performance may be inversely related to purchase, usage, and subjective familiarity—as well as the experimenter's predictions.

Such a problem will not be remedied simply by switching from a subjective or usage measure to an objective test if that test fails to capture task-relevant skills. For example, an objective test that only measures knowledge of product terminology may not lead to accurate predictions if the task requires highly differentiated knowledge of the brands currently on the market.

The complexity of consumer expertise also means that even when knowledge is considered in a more precise manner, predictions about its effects on behavior are not simple. Consider, for example, the relationship between expertise and evoked set size. For the simple reason that experts are exposed to more brands and see the same brands more frequently, a reasonable prediction is that their evoked sets are larger than those of novices. However, the size of the evoked set also depends on the specificity of the consumer's need and the variability in the products that can satisfy it. When a problem can be solved in diverse ways, the expert's ability to categorize products above the basic level should result in a larger and more heterogeneous evoked set. However, when the solution is specific, the expert's ability to make finer discriminations below the basic level should result in a narrower, more homogeneous evoked set. Thus, even when the appropriate dimension of expertise is identified, predictions must be conditioned on the precise nature of the task.

Finally, the effects of expertise on behavior may depend largely on the conditions under which it is examined. In some situations, a consumer's competence to carry out a task may not be reflected in his/her performance of it due to any of several internal and external constraints (Chomsky 1965; Wright 1975b). In other cases situational variables may exaggerate the effects of expertise. In general, higher levels of knowledge compensate, to some extent, for other constraints. Similarly, when knowledge is held constant, product-related tasks can be carried out more fully and efficiently as these internal and external conditions become less adverse. In short, we argue that the effects of knowledge on consumer behavior cannot be regarded only as main effects and must be studied along with a wide range of moderating variables.

Some Pitfalls of Expertise

Throughout this paper we have emphasized the benefits afforded by expertise. On occasion, however, we have noted that expertise is not uniformly advantageous (see, e.g., the discussion of negative induction). In general, experience and expertise may have unwanted con-

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sequences when they lead to overly strong beliefs about (a) one's true level of knowledge, and (b) the relations that exist between variables in the environment. Such beliefs may have negative effects on information search and information interpretation, respectively.

With regard to search, overestimated expertise about a product domain may result in an abbreviated search process (Büyükkurt and Büyükkurt 1986; Johnson and Russo 1984). That is, consumers may assume that additional external search will yield few new facts. Thus, they may generate a decision on the basis of previously learned information, or they may rely simply on a preprocessed choice rule (cf. Bettman and Zins 1977). Similarly, when external information is available, experts may engage in only shallow processing of it, believing that they know its content (and perhaps distorting it in the direction of those beliefs; Friedman 1979). In either case, if the ignored or poorly processed information contains truly new and important facts, suboptimal decisions may obtain. Such outcomes are not implausible given the overconfidence people exhibit regarding their level of knowledge (Fischhoff, Slovic, and Lichtenstein 1977; also see Nelson, Gerler, and Narens 1984).

Furthermore, even when information is given careful consideration, beliefs can bias its encoding and subsequent processing (see Alloy and Tabachnik 1984; Nisbett and Ross 1980; Taylor and Crocker 1981). For example, objective facts may be given a biased interpretation, the amount of covariance between attributes may be overestimated, and erroneous inferences may be made—all in ways that are consistent with the consumer's prior beliefs (cf. Bruner and Potter 1964). Thus, experts may process information analytically, but with the wrong rules and importance weights. Many so-called "fad diets" exemplify this problem. People who are uninvolved in dieting may choose foods holistically by simply eating what they have always eaten. Some highly involved dieters, on the other hand, may acquire fairly elaborate, but unhealthy, rules for dieting.

Finally, even if these biases do not affect the way information is learned, they can affect the way it is remembered (Arkes and Harkness 1980). As noted earlier, under certain conditions memory will favor facts that are consistent with a consumer's general beliefs, factual knowledge, or prior decisions. Moreover, any distortion that occurs during retrieval will be in the same direction.

Interestingly, as a result of these outcomes, assessment of one's own knowledge and confidence in one's ability to make judgments may become even more exaggerated. That is, in the absence of salient disconfirming evidence, knowledge may lead to a cycle of self-delusion.

Future Directions

In this paper we have organized a large number of empirical findings from the perspective of a single problem area—consumer expertise. Clearly, this is but a first step. There are a number of directions that can be pursued from this point. First, most of the specific research hypotheses that have been presented here are in need of empirical investigation. These hypotheses were formulated on the basis of established cognitive results and straightforward speculations about their implications for consumer behavior. Careful research is needed to confirm or reject these hypotheses. Second, there are likely to be important "second-order" phenomena that are related to the basic dimensions of consumer expertise. These would include *consumer metacognition* (i.e., consumer knowledge about how to increase one's level of expertise; e.g., Forrest-Pressley, MacKinnon, and Waller 1985), the role of various *contextual and motivational factors* in reducing or enhancing the effects of expertise (only some of which have been identified here), and the ways in which *marketer expertise* interacts with consumer expertise within the same product domain (cf. Weitz, Sujan, and Sujan 1986). Finally, theories must be developed that can explain these phenomena and integrate them into the broader realm of consumer behavior.

APPENDIX

Several issues are important to discuss for a complete understanding of the results regarding analytic classification reported in the main body of this paper. These issues include (1) the experimental paradigms used in classification research, (2) hypotheses about whether the memory-based representations that are used in classification tasks are unitary concepts, specific exemplars, or some combination of the two, and (3) hypotheses about the likelihood that either holistic or analytic processes are automatic. Each of these topics is taken up in turn.

Classification Paradigms

The two research paradigms that have addressed the issue of analytic processing are *simple classification* (e.g., Garner 1974, 1976; Shepp 1983) and *concept formation* (e.g., Bruner, Goodnow, and Austin 1956). In simple classification tasks, the criteria for classification are known (or subjectively determined) and no learning, per se, is required. Typically, the ability (or proclivity) of subjects to sort stimuli on the basis of a single attribute, ignoring all others, is the variable of interest. Thus, the analysis of stimuli into their constituent attributes has been the principal issue in this research. Several authors have noted that many models of consumer decision making imply just this sort of attribute analysis (e.g., Cohen 1982; Russo and Dosher 1983; Sujan 1985). Pertinent results from both paradigms were discussed in the section on holistic vs. analytic classification. The material presented here is based mainly on concept formation research.

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In concept formation tasks, the criteria for classification must be learned. Typically, subjects are trained (with feedback) on a fixed set of stimuli. Subsequently, they are tested (without feedback) on a set of stimuli that includes both training stimuli and new (transfer) stimuli. Quantitative and qualitative aspects of performance on the transfer stimuli are the principal basis for inferences about concept formation. Such experiments are particularly important for the study of consumer knowledge because they identify the processes that underlie the development of knowledge structures. These processes should be especially important for novice consumers, inasmuch as this classification process determines both the product categories that are learned and the category assignments of new brands as they are encountered. Pertinent results from concept formation experiments are reviewed throughout the remaining discussion of classification processes.

Unitary Concepts versus Specific Exemplars

Most models of concept formation assume that when new instances are encountered they are compared with memory representations of various concepts and are perceived as instances of the concept that best "matches" the instance. As was discussed earlier, the matching process may be analytic or holistic. Most concept formation research, however, has focused on the nature of the concept representation.[13]

Unitary models assume that concepts are represented in memory by a single description. The representation may be a fairly abstract set of rules for identifying instances of the concept, category, or class. Representations of this sort would include necessary and sufficient conditions, defining and characteristic features, and simple frequency of occurrence information for attributes across known exemplars (see Smith and Medin 1981). Such representations are examples of *concept schemas* (cf. Brewer and Nakamura 1984; Hastie 1981; Rumelhart and Ortony 1977; Taylor and Crocker 1981). Alternatively, the representation may be fairly concrete and represented in memory with the same degree of detail as specific instances. That is, people might have a specific image of the "average" or "prototypical" concept instance. These representations may be thought of as "fully instantiated schemas" and are generally referred to as concept *prototypes* (e.g., Fiske and Taylor 1984; Homa 1984).

Some of the most influential evidence regarding the nature of concept representations comes from early studies of visual prototypes (e.g., Franks and Bransford 1971; Posner and Keele 1968, 1970). In these experiments stimuli in each class were generated by altering a class prototype in various ways. The important finding was that after a training period on modified stimuli, the prototype was classified accurately the first time it was seen. In fact, performance for prototype stimuli was sometimes better than for training stimuli and it was always better than for new modifications. This basic effect has been replicated on a wide variety of perceptual and semantic stimuli (e.g., Elio and Anderson 1981; Hayes-Roth and Hayes-Roth 1977; Homa 1984; Medin and Schaffer 1978). Moreover, a recent experiment by Gordon and Holyoak (1983) found that previous exposure to modified stimuli resulted in a "mere exposure" effect on liking ratings that was equal to the effect of repeated exposures to the prototype itself (cf. Zajonc 1980; Zajonc and Markus 1982). In fact, the degree of generalization to new stimuli was monotonically related to the similarity of the new stimulus to the prototype. This extends previous results showing that the "transfer" of category-level affect depends on how well new exemplars match the category concept (Fiske 1982; Sujan 1985; cf. Cohen 1982).

These results have clear implications for consumer learning processes. When existing attributes are combined to form a new brand that resembles the product class prototype, the new brand will be easily identified as a member of the product class. When existing attributes are combined to form a new brand that differs significantly from the prototype, the new brand will be difficult to identify or it may be identified as belonging to a new product class (see the earlier discussion of graded structure). Also, category-level affect will generalize to new brands to the extent that they resemble the product class prototype.

Surprisingly, these results turn out not to be strong evidence for unitary concept representations. Many exemplar-based models make the same prediction. Exemplar-based models reject the idea that there is a single representation for each concept. Rather, they assume that new instances are compared only to previously learned instances. Experiments designed to discriminate between these models have produced ambiguous results. In particular, models that assume that new instances are compared to *all* previously learned exemplars are very difficult to discriminate from unitary representation models (Busemeyer, Dewey, and Medin 1984; Hayes-Roth and Hayes-Roth 1977; Hintzman and Ludlam 1980; Homa, Sterling, and Trepel 1981; Nosofsky 1986; Reed 1972).

There is evidence, however, that some exemplar-based models do make differential predictions. In particular, certain "nearest neighbor" models can be distinguished from unitary representation models and complete set models (Busemeyer et al. 1984; Hayes-Roth and Hayes-Roth 1977; Homa et al. 1981). Nearest neighbor models assume that new instances are com-

[13]Recently developed distributed memory models have addressed the problem of concept representation at a more microanalytic level and are able to reconcile some of the conflicting aspects of the models discussed here (Knapp and Anderson 1984; McClelland and Rumelhart 1985). However, here we are mainly interested in the empirical phenomena that drive this controversy, and a discussion of distributed memory models is beyond the scope of this paper.

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pared to the single previously learned instance that is most similar to it (Hintzman and Ludlam 1980). Although the generality of these findings has been questioned (Busemeyer et al. 1984), the ability to identify nearest neighbor classification processes is potentially important. Just as the use of *case,* rather than *base,* information can bias probability judgments (Kahneman and Miller 1986; Kahneman and Tversky 1973; Sherman and Corty 1984), nearest neighbor comparisons are likely to foster inappropriate classification. This will be especially true when the comparison is holistic rather than analytic.

Interestingly, nearest neighbor classification is most likely for categories that have few members and least likely for large categories (Homa et al. 1981; Knapp and Anderson 1984). Thus, classification processing may differ between product classes depending on the number of competitors. More importantly, as product familiarity increases, the consumer will encounter more brands and processing may shift from nearest neighbor comparisons to comparisons with a unitary concept representation. If, however, product familiarity results in further category-based differentiation below the basic level or an increase in the specificity of the basic level, classification at the lowest levels of the hierarchy may again depend on comparisons with nearest neighbors. Nevertheless, we would expect the comparison process to be more analytic for experts than for novices.

Recent research suggests that exemplar-based classification is dominant when initial learning is incidental; abstract rules are developed only when learning is intentional (Brooks 1978; Kemler Nelson 1984). Moreover, when the concept is complex, there is evidence for exemplar-based classification even when learning is intentional (Brooks 1978; Jacoby and Brooks 1984). As was discussed earlier, expert consumers may be more motivated than novices to classify products spontaneously, thereby providing the types of intentional learning that facilitate the development of schema-based classification.

On the other hand, there is ample evidence of rule-based classification for most simple concepts (Bourne, Dominowski, and Loftus 1979; Levine 1975), and people often attempt to find simple rules even when the concept to be learned is relatively complex (Martin and Caramazza 1980). Given these mixed results, many authors have proposed hybrid models for intentional learning in which schemas or prototypes are learned and used in conjunction with exemplar information (Elio and Anderson 1981; Homa et al. 1981; Medin, Altom, and Murphy 1984; cf., Busemeyer et al. 1984).

Overall, these results closely parallel those for holistic versus analytic processing. Thus, although structure and process are conceptually independent aspects of classification, it is likely that they are empirically correlated: holistic processing frequently will be exemplar-based, and analytic processing frequently will be schema-based.

Automaticity

One interesting hypothesis that has been advanced by several authors is that holistic processing is often automatic and occurs even when subsequent analytic processing is required and may lead to a different response (Lockhead 1972; Smith and Kemler Nelson 1984; Ward 1983). This is consistent with the results discussed earlier demonstrating that people often revert to holistic processing when cognitive capacities are overloaded. In some cases, previous experience may reduce the effortfulness of analytic processing to the same level as holistic processing and analytic processing may therefore be "preferred" (cf. Smith and Kemler Nelson 1984).

Thus far we have discussed evidence supporting only the view that analytic processing is effortful. Several authors, however, have suggested that some simple types of analytic processing occur automatically and underlie concept formation (Elio and Anderson 1981; Kellogg 1980; cf. Carlson and Dulaney 1985; Lewicki 1985, 1986). This is important because if learning is automatic, all product-related experiences (including advertising) should affect consumer knowledge about brand and product concepts. If conscious attention and significant cognitive resources are required, however, learning is likely only in high-involvement situations (as was discussed earlier).

Early research characterized concept formation as a conscious process of hypothesis-testing in which people actively search for the most successful rules of classification (Bruner et al. 1956; Levine 1975; Trabasso and Bower 1968; and, more recently, Martin and Caramazza 1980). Recent research, on the other hand, has focused on attribute frequency as the source of classification criteria (Elio and Anderson 1981; Hayes-Roth and Hayes-Roth 1977; Kellogg 1981; Neumann 1974; also see Rosch and Mervis 1975, and for a discussion of product prototypes and attribute frequency see Hirschman 1980a). Both accounts entail some degree of analytic processing insofar as they identify important attributes. The recent work, however, has not always assumed that processing must be consciously controlled.

Attribute frequency refers simply to the number of times the attribute has been observed as a property of some concept exemplar. If attribute frequency were the only source of classification criteria, consumer product concepts would be strongly biased toward the particular brands that have been frequently purchased by the consumer and toward brands that have been heavily advertised. This is especially likely if attribute frequency is encoded automatically. In fact, concept formation based on the automatic encoding of attribute frequencies is quite reminiscent of Krugman's classic description of the effects of low-involvement advertising (Krugman 1965). Krugman claimed that regardless of the amount of conscious attention paid to advertising, repeated exposure has the effect of changing perception

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by altering the salience of various product attributes. For instance, if advertising and packaging constantly remind consumers that certain diet soft drinks contain NutraSweet, the consumer may eventually come to use this feature as the main criterion for identifying diet drinks.

There is considerable evidence that frequency counting is, in fact, automatic for concept exemplars (Alba et al. 1980; Hasher and Zacks 1979, 1984). However, the evidence for automatic frequency counting of exemplar attributes has been mixed. Elio and Anderson (1981) obtained results consistent with automaticity when person concepts (i.e., stereotypes) were used as stimuli. Lewis and Anderson (1985), however, found that conscious hypothesis testing is necessary for learning in a problem-solving paradigm. Also, Carlson and Dulany (1985) provide strong evidence that unattended information has no affect on concept learning. Moreover, Barsalou and Ross (1986) experimentally compared frequency counting for the superordinate categories and the context-independent attributes (see Barsalou 1982) of presented exemplars. They found that category frequency was counted automatically, but that similar processing of attributes developed only after a large amount of practice.

Clearly, further research will be needed to resolve this important issue. Perhaps mere attention to attributes (but not explicit hypothesis testing) is sufficient for automatic frequency counting (cf. Greenwald and Leavitt 1984; Obermiller 1985). Current evidence suggests that complex rules are not learned without conscious hypothesis testing (Carlson and Dulaney 1985; Lewis and Anderson 1985; for a conflicting view see Reber 1976 and Reber and Allen 1978). Because consumer situations seldom provide objective feedback, it is possible that simple rules are automatically acquired at the expense of more complicated ones, which are more veridical. This should be especially true for novices because they are less likely to engage in effortful, analytic hypothesis-testing and they lack the high levels of attribute experience required for automaticity.

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